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INCLUDING

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CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

CONDUCTED BY

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VOL. IV.—ELEVENTH SERIES.  
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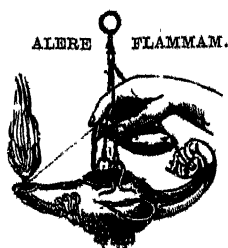
1939.

“ Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ :—ex harum usu *bonitas* Creatoris ; ex pulchritudine *sapientia* Domini ; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata ; à verè eruditis et sapientibus semper exculta ; malè doctis et barbaris semper inimica fuit.”—LINNÆUS.

“ Quel que soit le principe de la vie animale, il ne faut qu’ouvrir les yeux pour voir qu’elle est le chef-d’œuvre de la Toute-puissance, et le but auquel se rapportent toutes ses opérations.”—BRUCKNER, *Théorie du Système Animal*, Leyden, 1767.

..... The sylvan powers
Obey our summons ; from their deepest dells
The Dryads come, and throw their garlands
And odorous branches at our feet ; the Nymphs
That press with nimble step the mountain-thyme
And purple heath-flower come not empty-handed,
But scatter round ten thousand forms minute
Of velvet moss or lichen, torn from rock
Or rifted oak or cavern deep ; the Naiads too
Quit their loved native stream, from whose smooth face
They crop the lily, and each sedge and rush
That drinks the rippling tide : the frozen poles,
Where peril waits the bold adventurer’s tread,
The burning sands of Borneo and Cayenne,
All, all to us unlock their secret stores
And pay their cheerful tribute.

J. TAYLOR, *Norwich*, 1818.



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THE ANNALS AND MAGAZINE OF NATURAL HISTORY.

[ELEVENTH SERIES.]

"..... per litora spargite muscum,
Nalades, et circum vitreos considite fontes:
Pollice virgineo teneros hic carpite flores:
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchylia succo."
N. Parthenii Giannettasi, Ecl. 1.

No. 19. JULY 1939.

I.—*On the Curculionid Tribe Coryssomerini (Coleopt.).*

By Sir GUY A. K. MARSHALL, F.R.S.

THE Old World weevils of the subfamily Zygopinæ in which the front coxæ are contiguous have, in the most recent classification (Hustache, *Livre du Centenaire*, Soc. Ent. France, 1932, pp. 369–380), been divided into three tribes: Coryssomerini, Metialmini, and Synophthalmini. Of these, the first two have been separated solely on the greater or less approximation of the eyes; but this character is not consistently applicable and clearly has not any tribal value in this group. The Synophthalmini can be separated from the Coryssomerini by the arcuate dilation of the upper edge of the metepisterna and a corresponding sinuation in the lateral margin of the elytra; but in several cases this character shows a marked reduction, and some of the genera of these two groups converge so closely in other respects that a more balanced view of the inter-relationships of the genera is likely to be obtained by uniting them into a single tribe—Coryssomerini.

In addition to the contiguous front coxæ, this tribe is further characterized by the following combination

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of features: the absence of any channel on the prosternum, the wide separation of the hind coxæ from the margin of the elytra, and the structure of the mesepimera. These latter sclerites are greatly extended upwards between the bases of the prothorax and elytra, so as to be clearly visible from above, their upper limit being far higher than that of the metepisterna and reaching at least to the level of stria 9 on the elytra; as a result of this extension the mesepimera are at least as large as and frequently much larger than the mesepisterna.

The present classification of the tribe is clearly unsatisfactory—partly because some of the genera are evidently composite, so that it is difficult to give precise characters for distinguishing them, and partly because there has been a good deal of confusion regarding some of the older genera. An attempt is therefore now made to clarify their relationships.

The first difficulty that arose was the position of the genus *Lamyrus*, which was based by Schönherr (Mant. sec. Curc. 1847, p. 68) on a single small species from South Africa and has hitherto remained unrecognized by later authors. Lacordaire was unacquainted with Schönherr's species (*bohemani* Fhs.) and associated with it two species which Schönherr had placed in his own genus *Coryssomerus*, viz., *cervinus* Boh., from West Africa, and *lepidus* Fhs., from South Africa*, obviously basing his definition of *Lamyrus* on the former species. He then grouped the three genera *Coryssomerus*, *Lamyrus*, and *Euryommatus* Roger into his tribe Coryssomerides. The genera *Phacemastix* Schönh. and *Synophthalmus* Lac. he separated widely from them in his tribe Ambatides, on account of their having the pygidium concealed.

Faust (Stett. ent. Ztg. 1883, p. 475) showed that Lacordaire's definition of *Lamyrus* did not agree with that of Schönherr; he therefore transferred *cervinus* and *lepidus* into *Metialma* Pascoe, leaving only the original genotype in *Lamyrus*, which he suggested should probably be placed in Lacordaire's tribe Ambatides. He further gave a key to the genera in Coryssomerini, in which he included *Coryssomerus*, *Euryommatus*, *Metialma* Pasc., and *Panoptes* Gerst.

* It may be noted that in the recent Catalogue of Zygopinae (Coleopt. Catal. pars 136, 1934) these two species appear twice—under *Euryommatus* and under *Metialma*.

Subsequently another South African species was attributed to *Lamyrrus*, namely, *L. sphadasmoides* Pér. 1888. In the Catalogue of Zygopinæ (where it appears as *spadasmoides*) this species has been referred to *Euryommatus*; but Dr. A. J. Hesse, of the South African Museum, has kindly sent me recently two specimens compared with Péringuey's type, and these are undoubtedly the widely spread *Phylaitis caffer* Fhs. (tribe Mecopini), so that *sphadasmoides* must sink as a synonym of this species.

In the same Catalogue *Lamyrrus* has been sunk as a subgenus of the purely Palæarctic, and subsequently described, genus *Euryommatus* Roger, 1857, a clearly untenable position.

Having recently examined a very small South African weevil that I had referred to the genus *Phacemastix* Schönh., it seemed that here at last was a species that really did agree with Schönherr's definition of *Lamyrrus*. On sending a specimen to the Stockholm Museum Dr. A. Roman very kindly compared it with the unique type of *Lamyrrus bohemani* Fhs., and has expressed himself as being fully satisfied that it is actually that species. Thus, as Faust rightly suggested, *Lamyrrus* belongs to the Synophthalmini (included by Lacordaire in his Ambatides), and the name must be applied to various species at present referred to *Phacemastix*, a composite genus which is analysed in the key given below.

To turn now to the two other African species erroneously placed by Lacordaire in *Lamyrrus*—*lepidus* Fhs. and *cervinus* Boh.; the former was described from a single specimen collected by Drege in the eastern parts of South Africa, and the type was unfortunately returned to him, as were many other Schönherrian types. Drege's collection has not so far been traced and the type is therefore not available. The insect is, however, undoubtedly a *Metialma*, and Fåhræus's description applies in every detail to a common South African species described by him long afterwards as *Menemachus mæstificus*—this generic allocation being certainly erroneous (type seen). I have therefore no hesitation in sinking "*Menemachus*" *mæstificus* Fhs. 1871 as a synonym of *Metialma lepidus* Fhs. 1847.

As regards the second species, *cervinus* Boh., Faust also transferred this to *Metialma*, but it presents, in

common with several other West African species, a number of very distinctive characters, so that a new genus is proposed for it below.

As here reconstituted the tribe Coryssomerini will now comprise the following 22 genera.

Key to the Genera of Coryssomerini.

- 1 (18). Elytra with stria 1 reaching the base.
- 2 (17). Pygidium exposed; tooth on hind femora never larger than that on front pair.
- 3 (10). Mesosternal process narrower than a median coxa, more or less sloping; prosternum anteriorly shorter than a front coxa.
- 4 (5). Tarsal claws strongly appendiculate; corbels of hind tibiae lying entirely on the inner face and not forming an angulation on the dorsal edge; front tibiae strongly arcuate dorsally throughout and with a long stout tooth on the lower edge near the apex; eyes separated throughout by a narrow raised carina, their lower margin lying below the level of the upper edge of the scrobe; Madagascar 1. *Panoptidius* Fst.
- 5 (4). Tarsal claws simple; upper end of corbels of hind tibiae forming an obtuse angulation on the dorsal edge; front tibiae almost straight dorsally on the apical half and without any tooth on the lower edge; eyes with their lower margin lying above the level of the upper edge of the scrobe.
- 6 (9). Front femora thicker than the hind pair and with a much larger tooth; metasternum much longer than ventrite 1 behind the coxa; scutellar area of elytra depressed, stria 1 curved at the base.
- 7 (8). Eyes closely subcontiguous; metepisterna rapidly narrowing posteriorly throughout; hind tarsi with joint 1 longer than the rest together, hind femora exceeding the body; rostrum of ♂ long and slender, with the antennae inserted behind the middle; Africa 2. *Ospiliades* Hllr.
- 8 (7). Eyes separated; metepisterna parallel-sided for more than half their length; hind tarsi with joint 1 not longer than the rest, hind femora not exceeding the body; rostrum of ♂ comparatively short and stout, with the antennae inserted beyond the middle; E. Africa [gen. nov.]
- 9 (6). Front femora not thicker than the hind pair and with a similar tooth; meta- 3. *Anobleptus*,

- sternum as long as ventrite 1 behind the coxa; scutellar area not depressed, stria 1 straight at the base; eyes separated; Palearctic Region [Schönh.]
- 10 (3). Mesosternal process as broad as a coxa, vertical. 4. *Coryssomerus*
- 11 (12). Prosternum anteriorly not longer than a coxa; eyes closely subcontiguous; scutellum without an adjoining sulcus; Africa, Asia 5. *Metialma* Pasc.
- 12 (11). Prosternum anteriorly much longer than a coxa; eyes separated; scutellum with a sulcus on each side.
- 13 (14). Head with a smooth median longitudinal costa; elytra with interval 5 subcostate; front tibiae straight or shallowly sinuate dorsally; antennal club with joint 1 shorter than 3, the apical margin of 2 very oblique; Tropical Africa 6. *Borthis*, gen. nov.
- 14 (13). Head without any costa; elytra with interval 5 not subcostate; antennal club with joint 1 as long as or longer than 3, the apical margin of 2 truncate or subtruncate.
- 15 (16). Front tibiae straight or shallowly sinuate dorsally (apart from the usual basal curve), hind tibiae carinate dorsally; metepisterna narrowing continuously from base to apex; E. Africa 7. *Armylus*, gen. nov.
- 16 (15). Front tibiae strongly arcuate dorsally, hind tibiae not carinate dorsally; metepisterna parallel-sided in the posterior three-fourths; Africa 8. *Almetus*, gen. nov.
- 17 (2). Pygidium covered; tooth on hind femora larger than that on front pair; prosternum anteriorly much longer than a front coxa; mesosternal process much narrower than a median coxa; hind femora far exceeding the body; joint 2 of the funicle twice as long as 1; W. Africa [Hust.]
- 18 (1). Elytra with stria 1 not reaching the base but ceasing behind the scutellum; pygidium covered. 14. *Tyriotydeus*
- 19 (30). Lateral margin of elytra straight or arcuate.
- 20 (27). Front femora thicker than hind pair and with a much larger tooth.
- 21 (26). Margin between the lateral and ventral faces of rostrum sharply defined, being a continuation of the carina bounding the upper edge of the scrobe; apex of scape nearly or quite reaching base of rostrum.
- 22 (23). Lower margin of eye lying far above the upper edge of the scrobe; Palearctic Region [Rog.]
- 23 (22). Lower margin of eye on a level with the upper edge of the scrobe. 9. *Euryommatus*

- 24 (25). Eyes sharply acuminate in front, their lower margin sinuate; front tibiae arcuate dorsally; basal joint of antennal club shorter than (or as long as) the rest together; Asia, Africa .. 10. *Osphilia* Pasc.
- 25 (24). Eyes rounded in front, their lower margin straight; front tibiae straight dorsally (apart from the usual basal curve); basal joint of antennal club longer than the rest together; Madagascar 12. *Panoptes* Gerst.
- 26 (21). Margin between the lateral and ventral faces of rostrum indefinite, the carina along the upper edge of the scrobe passing higher up along the side of the rostrum and not reaching the base; apex of scape remote from base of rostrum; W. Africa [Hllr.]
- 27 (20). Front femora not thicker than hind pair and with the tooth not larger. 13. *Anchistosphilia*
- 28 (29). Metasternum much longer than a median coxa; prothorax as long as broad; legs very long and slender, hind femora far exceeding the body, front tibiae straight or shallowly sinuate dorsally, posterior pairs quite straight beneath, joint 1 of hind tarsi longer than the rest together; rostrum strongly curved, scrobes not continued beyond the antennae; Malay Archipelago 15. *Emexaure* Pasc.
- 29 (28). Metasternum at its shortest part but little longer than a median coxa; prothorax transverse; legs short, hind femora not nearly reaching apex of elytra, front tibiae arcuate dorsally, posterior pairs sinuate basally beneath, joint 1 of hind tarsi only as long as 2+3; rostrum nearly straight, scrobes continued deeply far beyond antennae; Congo [gen. nov.]
- 30 (19). Lateral margin of elytra sinuate above the metepisternum. 11. *Pycnosphilius*,
- 31 (42). Rostrum curved continuously with the forehead; front tibiae without a sub-apical tooth on the lower edge; front femora with a tooth not larger than that on hind pair, tarsal claws simple or appendiculate, never fissile; prosternum anteriorly as long as or longer than a coxa.
- 32 (39). Mesosternum depressed, the intercoxal process more or less steeply declivous; metasternum between the coxae much shorter than ventrites 1+2 behind the coxa; prothorax not longer than broad.
- 33 (38). Tarsal claws simple.
- 34 (35). Prosternum anteriorly only as long as a coxa; head not constricted behind the eyes, which are very narrowly

- separated or contiguous with their curvature absolutely continuous with that of the head; apical angles of ventrite 2 produced backwards; Africa [gen. nov.]
17. *Amphibleptus*,
- 35 (34). Prosternum anteriorly longer than a coxa; head very shallowly constricted behind the eyes, which are thus slightly higher posteriorly than the neck.
- 36 (37). Eyes closely contiguous; ventrite 2 with the apical angles produced backwards; antennal club much shorter than funicle; S. and E. Africa 16. *Lamyrys* Schönh.
- 37 (36). Eyes widely separated, with a sulcus between them posteriorly; ventrite 2 truncate on its apical margin; club as long as or much longer than funicle; S. & E. Africa [Schönh.]
19. *Phacemastix*
- 38 (33). Tarsal claws appendiculate; ventrite 2 with the apical angles produced; prosternum anteriorly longer than a coxa; eyes distinctly separated; club of antennæ shorter than funicle; Africa [gen. nov.]
18. *Lamyrodes*,
- 39 (32). Mesosternum not depressed, but almost on a level with the metasternum, mesosternal process much narrower than a coxa; metasternum between the coxæ as long as ventrites 1+2 behind the coxa; prothorax longer than broad.
- 40 (41). Scape of antennæ longer than the club; prothorax with the front margin truncate above and below, without postocular lobes; hind femora extending well beyond the elytra; Philippines, Formosa [Lac.]
20. *Synophthalmus*
- 41 (40). Scape of antennæ much shorter than the club; front margin of prothorax broadly sinuate both above and below, thus forming short postocular lobes; hind femora not or only slightly exceeding the elytra; Africa .
21. *Anascopus* Mshl.
- 42 (31). Rostrum almost straight, forming a wide angle with the forehead; front tibiæ with a broad subapical tooth on the lower edge; tooth on front femora much larger than that on hind pair, which exceed the apex of the elytra; tarsal claws deeply cleft; W. Africa 22. *Tyriotes* Pasc.

The genus *Aocnus* Schönh. 1859, from Transcaucasia, has been included in the Coryssomerini in all recent catalogues, though Faust long ago (Stett. Ent. Zeit. 1883, p. 481) pointed out that it could not belong to

that tribe ; but it was impossible to decide its position with certainty from the original description. Thanks to the kindness of Dr. Kai L. Henriksen, of Copenhagen, I have now been able to examine the unique type, and there can be no doubt that *Aocnus* is merely a synonym of *Sibinia* Germ. (Tychiinae).

1. PANOPTIDIUS Faust.

Genotype : *P. rufipes* Fst. (Madagascar).

Faust based his genus on a single male from Madagascar, and subsequently added two more species, *pauli* and *meleagris*, from East Africa. Thanks to the kind assistance of Dr. K. M. Heller, I was able to examine the types of all three species while on a recent visit to Dresden. There can be no doubt that the continental species are generically distinct both from *rufipes* and from each other, and they will be found below in the genera *Anobleptus* and *Lamyrodes* respectively ; so that *Panoptidius* reverts to a monotypic genus.

The following characters may be added to Faust's generic description :—Rostrum not widened but parallel-sided at the base. Joint 1 of hind tarsi as long as 2+3. Anterior part of prosternum much shorter than a coxa ; metepisterna parallel-sided in the middle for more than half their length. The three intermediate ventrites angulate laterally.

2. OSPHILIADES Heller.

Genotype : *O. sansibaricus* Hllr. (E. Africa).

The only other species known to me that are properly referable to this genus are : *O. helleri* Fst., *O. kraatzi* Fst., and *O. ellenbergeri* Hust., all from West Africa.

Of the four Abyssinian species that have been placed in *Osphiliades*, *O. scotti* Hust. must be transferred to *Metialma* ; and for *O. hirtipes* Hust., *O. euphorbiae* Hust., and *O. abyssinicus* Hust., a new genus is proposed below (*Armylus*). *O. longirostris* Hust. is referred to another new genus (*Borthus*).

3. ANOBLEPTUS, gen. nov.

Head with the eyes narrowly separated and not acuminate in front, their lower margin well above the

level of the upper edge of the scrobe. *Rostrum* of ♂ (♀ not seen) stout, shorter than the head and prothorax, curved, subparallel-sided at the base and there forming a wide angle dorsally with the forehead, not compressed dorso-ventrally in the apical half; the carinate upper edge of the scrobe continuing along the lower lateral margin of the rostrum to the base. *Antennæ* (♂) inserted beyond the middle of the rostrum with the scape reaching its base; funicle longer than the club, with joint 1 longer than 2, the distal joints transverse and 7 not annexed to the club, the basal joint of which is transverse and shorter than 2+3. *Prothorax* deeply bisinuate at the base. *Scutellum* elongate, with a deep furrow on each side. *Elytra* impressed behind the scutellum, with stria 1 reaching the base, the lateral margins not sinuate. *Legs* with the front femora thicker than the hind pair and with a much larger tooth, the hind pair not exceeding the body; tibiae with the mucro obsolete, front pair strongly curved only in the basal half and the dorsal edge with a small sinuation close to the apex, the posterior pairs shallowly sinuate beneath at the base, with the corbels ascending the dorsal edge and terminating above in an obtuse angulation; hind tarsi with joint 1 longer than 2+3, 3 broadly bilobate, the tarsal claws simple. *Sternum* with the prosternum anteriorly as long as a coxa; mesosternal process much narrower than a coxa, mesepimera twice as large as the mesepisterna; metasternum much longer than ventrite 1 behind the coxa, the metepisterna parallel-sided for the greater part of their length. *Abdomen* with the pygidium fully exposed, the intermediate ventrites angulate laterally, the hind margin of the last ventrite deeply sinuate.

Genotype: *Panoptidius pauli* Fst. (E. Africa).

The characters distinguishing this genus from its nearest allies, *Panoptidius* and *Osphiliades*, are sufficiently indicated in the key. Apart from the genotype, I know of no other species that can be attributed to it.

4. CORYSSOMERUS Boh.

* Genotype: *C. capucinus* Beck.

This is a purely Palearctic genus, but in the Catalogue of Zygopinae two Ethiopian species have inadvertently been included in it, namely, *aterrimus* Fst. and *nitidulus*

Fst.; these should be deleted, for they were described by Faust in the genus *Corynemerus* (subfamily Campyloscelinæ), to which they properly belong.

5. METIALMA Pascoe.

Apparently the type of this genus has not hitherto been fixed, and therefore from the four Oriental species originally included in it by Pascoe I select *M. scenica* Pasc., as being the largest and best known.

This is a very homogeneous and distinctive genus, but it must be noted that in the genotype and many other species the tarsal claws are distinctly appendiculate, whereas in the remainder they are simple. I cannot here regard this character as having generic value, because it does not as yet appear to be correlated with any other distinctive character; and I hold that genera erected on a single difference of this kind are taxonomically unsound, because they exaggerate the importance of a minor distinction while obscuring the close relationship of the species in every other respect. It is a matter of common experience that characters which may have a generic or even tribal importance in one group may be of minor significance in another. And, broadly speaking, the object of a scientific taxonomy should be to emphasize relationships, rather than to exaggerate differences.

6. BORTHUS, gen. nov.

Head with the eyes rounded in front, distinctly separated, the space between them being about as wide as joint 2 of the funicle, their lower margin arcuate and lying above the level of the upper edge of the scrobe; vertex with a short smooth longitudinal costa. *Rostrum* very long, from one-half to two-thirds the length of the whole body, subcylindrical, but widening at both base and apex, strongly curved, with the antennæ inserted well behind the middle in both sexes. *Antennæ* with joint 1 of the funicle longer than 2, joints 3-6 as long as or longer than broad; club elongate, with joint 1 much shorter than 3, the apical margin of 2 very oblique. *Prothorax* subconical, shallowly subtubulate at the apex, deeply bisinuate at the base. *Scutellum* sunk a little

below the level of the elytra. *Elytra* ovate, with a broad shallow transverse impression just behind the base; the striae deep, with isolated punctures that are broader than the striae, stria 1 reaching the base; the intervals broad and densely punctate, 5 always subcostate. *Legs* with the femora carinate laterally, with a sharp triangular tooth, that on the front pair being larger than the others, the hind pair not exceeding the abdomen; front tibiae straight or shallowly sinuate dorsally, the hind pair carinate dorsally, at least on basal half; claws divaricate, simple. *Sternum* with the prosternum anteriorly much longer than a coxa; mesosternal process vertical, as broad as a median coxa, the mesepimera considerably larger than the mesepisterna; metepisterna gradually narrowing posteriorly throughout. *Abdomen* with the pygidium broadly exposed, almost or quite horizontal; venter without any darker median patch on the intermediate ventrites, but with a large bare patch in the middle of the basal ventrite, the intercoxal process of which is wider than a hind coxa, ventrite 2 as long as 3+4 in the middle, all the intermediate ventrites produced backwards at their apical angles.

Genotype: *Coryssomerus cervinus* Boh.

Osphiliades longirostris Hust. 1932, also belongs to this genus. The four species here included in it are very homogeneous, and *Metialma* may be distinguished from them by the following characters:—the head has no costa on the vertex, the eyes being closely subcontiguous; rostrum never longer than the head and prothorax, and with the antennae at or beyond the middle; antennal club with joint 1 much longer than 3 and the apical margin of 2 almost transverse, the funicular joints 3–7 all transverse; scutellum on a level with the elytra, on which the intervals are never subcostate; front tibiae strongly arcuate dorsally; metepisterna parallel-sided in the posterior three-fourths; prosternum anteriorly not longer than a coxa; a large dark median patch on the intermediate ventrites, pygidium steeply declivous.

The genus *Osphiliades* differs in having the eyes closely subcontiguous, without any median costa on the vertex; antennal club with joint 1 much longer than 3, and the apical margin of 2 truncate; elytra without subcostate

intervals; hind femora exceeding the body; mesosternal process narrower than a median coxa, metepisterna much more narrowed posteriorly, so that a hind coxa is as wide as the intercoxal process of the venter.

Key to the Species of Borthus.

- 1 (2). Prothorax with a narrow abbreviated median carina; pygidium of ♂ with a deep median longitudinal division at apex, forming a U-shaped excision as seen from beneath *fissicauda*, sp. n.
- 2 (1). Prothorax without any trace of a median carina; pygidium of ♂ not divided.
- 3 (8). Males; rostrum strongly and closely punctate on apical half; ventrite 1 with a median depression.
- 4 (5). Pygidium elongate, conical, from one-half to two-thirds as long as ventrite 5; apex of scape separated from base of rostrum by the length of 1st funicular joint; all tibiae and tarsi clothed above with long erect setae *cervinus* Boh.
- 5 (4). Pygidium short, broadly truncate, only shortly projecting beyond ventrite 5; apex of scape nearly or quite reaching base of rostrum.
- 6 (7). All the tibiae clothed dorsally with long erect setae; pygidium with a median triangular impression; elytra with irregular dark brown spots at about the middle between striae 4 and 9 ... *longirostris* Hust.
- 7 (6). Tibiae without long erect setae dorsally; pygidium with a deep longitudinal median impression at the apex; elytra with a large subquadrate black patch mainly before the middle between striae 4 and 10 *binotatus*, sp. n.
- 8 (3). Females; rostrum more finely and less closely punctate apically; ventrite 1 not impressed.
- 9 (12). Ventrite 5 with a deep depression in the basal angles, the median area with only short recumbent setae; elytra without a large subquadrate black lateral patch.
- 10 (11). Sides of prothorax almost straight; elytra with the dark brown subapical patch on the suture much shorter than the pale area just behind it ... *cervinus* Boh.
- 11 (10). Sides of prothorax gently rounded; elytra with the dark subapical sutural patch about as long as the paler area behind it *longirostris* Hust.
- 12 (9). Ventrite 5 without a depression in the basal angles, the median area with

long erect setæ on the apical half;
 elytra with a large subquadrate black
 patch before the middle between
 striæ 5 and 10 *binotatus*, sp. n.

Borthus fissicauda, sp. n.

♂♀. Piceous brown, with separated narrow grey or yellowish scales, which are very dense between the eyes; pronotum with an indefinite spot of denser scales in the four angles and two in the middle of the disk; elytra with indefinite dark brown mottling especially before the middle between striæ 5 and 9, the striæ with scattered spots of a few whitish scales.

Rostrum two-thirds to half the length of the whole body, usually longer in ♂ and more curved in ♀, with coarse confluent punctation on the basal half and there bearing a sharp median carina and two sinuous ones on each side, the apical half strongly and closely punctate in ♂, more finely in ♀. *Antennæ* with the scape reaching the base of the rostrum in ♀ but not in ♂. *Prothorax* subconical, with the sides almost straight and with a very shallow subtubulate constriction at the apex; the dorsum with dense subreticulate punctation and a fine abbreviated median carina. *Scutellum* with dense suberect grey scaling, without erect pubescence or a median carina. *Elytra* gradually narrowing from the shoulders in ♂, slightly shorter and more parallel-sided in the basal half in ♀, intervals 3 and 5 both elevated behind the middle. *Legs* with rather thin grey scaling, a broad blackish band across the thickest part of the hind femora only; only the front tibiæ of ♂ with long erect setæ above and below, and similar setæ on the upper surface of the front tarsi. *Abdomen* of ♂ with the pygidium broadly and deeply incised in the middle dividing it into two broadly rounded lobes, from the ventral aspect about half as long as ventrite 5, the apical excision appearing U-shaped; ventrite 5 of ♂ flattened on the apical half and there devoid of scaling but with erect hairs, which are short in the middle and longer laterally; ventrite 5 of ♀ with a deep depression in the basal angles, the apical half with recumbent scales and setæ.

Length 9-11 mm., *breadth* 4.0-4.4 mm.

TANGANYIKA TERRITORY : Ukerewe I., Lake Victoria, 2 ♂♂, 2 ♀♀ (*Father P. A. Conrads*—type); New Bethel, Usambara, 1 ♂, 1 ♀, viii. 1903 (Berlin Mus.); Niasoko, 1 ♂, 1 ♀, vi. 1915 (Berlin Mus.). KENYA COLONY : Mara R., Masai Reserve, 1 ♂, 1932 (*Dr. E. A. Lewis*).

Type ♂ in the British Museum.

I am indebted to Dr. Kuntzen, of the Berlin Museum, for examples of this species.

Borthus binotatus, sp. n.

♂♀. Piceous black, with grey to yellowish grey scaling which does not conceal the integument; forehead with dense yellowish scales; pronotum with sparse scaling and a very indefinite darker spot on each side of the disk behind the middle; elytra with a large subquadrate black patch (mainly in front of the middle) between striae 4 and 10, and with an elongate brown patch on the suture near the apex which is as long as the paler apical area behind it.

Rostrum about half (♂) or two-thirds (♀) the length of the whole body, otherwise as in *L. fissicauda*, sp. n. *Antennae* honey-brown, with the club fuscous, the scape reaching the base of the rostrum in both sexes. *Prothorax* subconical, very slightly rounded laterally and with a very shallow subtubulate constriction at the apex; the dorsum with dense subreticulate punctation without any median carina. *Scutellum* not squamose, but with dense erect pubescence which almost conceals a median carina. *Elytra* gradually narrowing from the shoulders, interval 5 distinctly elevated but 3 scarcely so. *Legs* with rather thin grey scaling, the hind femora only with a large dorsal subapical black patch; tibiae and tarsi of ♂ without any long erect setae. *Abdomen* with the pygidium rather more convex and more declivous than in any of the other species, that of ♂ only very shortly projecting beyond ventrite 5 and having dorsally a deep longitudinal median impression at the apex; pygidium of ♀ broadly flattened transversely at the apex; ventrite 5 of ♂ broadly impressed in the middle and there quite bare of scaling, clothed with very fine subrecumbent pubescence and with long erect setae laterally at the apex; ventrite 5 of ♀ not impressed in the basal angles, the apical half with dense erect setae; ventrite 1 of ♂ with the

median depression much deeper than in any other species.

Length 8-9 mm., breadth 3.5-4.0 mm.

UGANDA: Tero Forest, 1 ♂, 2 ♀♀, vii. 1912 (*C. C. Gowdey*); Jinja, 1 ♀, xii. 1928 (*Dr. van Someren*—type).

Type ♀ in the British Museum.

7. ARMYLUS, gen. nov.

Head with the eyes narrowly separated above, their lower margin arcuate and about on a level with the upper edge of the scrobe; vertex without a median costa. *Rostrum* much longer than the head and prothorax, curved, the outline forming a slight angle with the forehead. *Antennæ* inserted somewhat behind the middle of the rostrum in both sexes; funicle with the two basal joints equal or subequal, the distal joints longer than broad; club with joint 1 longer than 3, the apical margin of 2 truncate. *Prothorax* more strongly constricted near the apex than in *Borthus* and usually with discal impressions. *Scutellum* slightly immersed and without lateral sulci. *Elytra* oblong-ovate, almost parallel-sided from the shoulders to the middle, with the transverse basal depression usually very shallow, the posterior calli prominent; stria 1 reaching the base, 2-4 not curving inwards basally, without any costate intervals. *Legs* as in *Borthus* but the femora not carinate laterally. *Sternum* and *abdomen* as in *Borthus*, but the pygidium declivous.

Genotype: *Osphiliades euphorbiæ* Hust.

In addition to the genotype, *Osphiliades abyssinicus* Hust. and *hirtipes* Hust. (types seen) belong to this genus, all three species occurring at altitudes of 6000-8000 ft. in Abyssinia.

Metialma kilimana Aur., from Kilimanjaro, is also an *Armylus* (cotype seen).

It is of interest to note that all the four species of this genus are associated with the large arborescent Euphorbias.

8. ALMETUS, gen. nov.

Head without any median longitudinal costa, its dorsal outline only slightly more convex than that of the base of the rostrum; eyes distinctly separated

especially in their posterior half, not acuminate anteriorly, with the lower margin strongly arcuate and above the level of the scrobe. *Rostrum* much longer than the pronotum, strongly curved, only slightly widening at the base, the basal half with a fine smooth median carina and two sinuous ones on each side. *Antennæ* inserted at or behind the middle of the rostrum; funicle with joint 1 much longer than 2, the distal joints transverse; club with joint 1 as long as or longer than 3, the apical margin of 2 subtruncate. *Prothorax* as in *Borthus*, gen. nov. *Scutellum* on a level with the elytra and with a sulcus on each side. *Elytra* ovate, with a broad transverse impression close to the base, the apical calli prominent, the striæ as in *Borthus*, but interval 5 not raised. *Legs* as in *Borthus*, except that the front tibiæ are strongly arcuate on the dorsal edge and have the sinuation on the lower edge extending for more than half its length, and the hind tibiæ are not carinate dorsally. *Sternum* and *abdomen* as in *Borthus*, except that the metepisterna are parallel-sided in the posterior three-fourths, the pygidium is declivous and more or less impressed apically, and the basal ventrite is not bare in the middle.

Genotype : *Almetus sheppardi*, sp. n.

Key to the Species of *Almetus*.

- 1 (8). Elytra with interval 6 not depressed below 4 and 7, interval 3 not more raised in the middle than the others.
- 2 (5). Apical depression on the pygidium with a strong median carina.
- 3 (4). Elytra with a depression at the base of stria 6 between the humeral callus and the basal angle of the prothorax; rostrum of ♂ with a broad deep lateral furrow from base to antennæ; lower edge of hind tibiæ distinctly sinuate in basal half. *sheppardi*, sp. n.
- 4 (3). Elytra without any depression in front of the humeral callus; rostrum of ♂ without a lateral sulcus; lower edge of hind tibiæ almost straight. . . . *nyanzæ*, sp. n.
- 5 (2). Apical depression on pygidium without any median carina.
- 6 (7). Elytra with a distinct transverse basal depression, the basal angles with a large patch of pale scaling, the subapical calli prominent; propleuræ

- entirely covered with pale scaling;
length 5-6 mm. *nyikanus*, sp. n.
- 7 (6). Elytra with the basal depression very feeble or almost obsolete, without any pale patch in the basal angles, the subapical calli much reduced; propleuræ with pale scaling only on the lower half; length 3.5-4 mm. ... *minor*, sp. n.
- 8 (1). Elytra with interval 6 deeply depressed at the base, the depression extending from stria 4 to 6; interval 3 slightly more raised in the middle than the other intervals; apical depression on pygidium without any median carina. *capensis*, sp. n.

Almetus sheppardi, sp. n.

♂♀. Derm black, with rather dense brown scaling, more or less variegated with darker and lighter spots; prothorax with the disk more sparsely squamose than the sides and thus appearing darker with two small admedian pale spots in front of the middle, and two rather oblique dark brown patches on the basal margin, their inner edge on a line with stria 1; elytra with very indefinite darker patches laterally, small spots of whitish scales in the striæ (especially near the base), and a short pale apical stripe on the suture preceded by a dark brown patch; legs with brownish-grey scaling and a darker subdenuded patch on the femora; underside with uniform brownish-grey scales.

Rostrum of ♂ rather stout, very strongly curved, so that the apical part is almost perpendicular to the base, very slightly narrowing from the base to the antennæ (at the middle) then widening again to the apex, strongly and closely punctate throughout, with a deep lateral sulcus from the base to the antennæ, and the median carina extending nearly to the apex; rostrum of ♀ not so strongly curved, much narrower in the middle, with the lateral sulcus indistinct, the median carina extending only as far as the antennæ (inserted a little behind the middle), and the apical part much more finely punctate. *Antennæ* with joint 1 of the club about as long as 3. *Prothorax* somewhat broader than long, almost parallel-sided in the basal third, roundly narrowing in front, with a shallow apical constriction continued broadly across the dorsum, which is covered with dense shallow subconfluent reticulate punctures without any smooth

median line. *Scutellum* with a low median carina, which is normally hidden by dense suberect scales. *Elytra* ovate, narrowing from the shoulders, with the basal transverse depression shallow and quite flat from the scutellum to the base of interval 6, the basal margin not being raised, the suture slightly elevated on the declivity; interval 6 much higher at the base than 7, owing to there being a marked depression between the humeral callus and the basal angle of the prothorax. *Legs* with a rather broad triangular tooth on the hind femora; the lower edge of the hind tibiæ sinuate on the basal half, the sinuation on the front tibiæ extending for two-thirds of the length. *Pygidium* with a distinct median carina in the apical depression, the lateral angles with a projecting tuft of scales in the ♂ only.

Length 6.0–7.5 mm., *breadth* 3.0–3.5 mm.

PORTUGUESE E. AFRICA: Beira, 5 ♂♂, 3 ♀♀, 5. x. 1900 (type ♂), viii. 1903, xi. 1905, ii. 1906 (*P. A. Sheppard*), 1 ♂, 2 ♀♀, xi. 1900 (*G. A. K. M.*).

Type in the British Museum.

Almetus nyanzæ, sp. n.

♂♀. Colouring extremely similar to that of *A. sheppardi*, sp. n., but the scaling more grey, with irregular transverse patches of dark brown.

The structural characters distinguishing this species from *A. sheppardi* are as follows:—*Rostrum* of ♂ without the deep lateral sulcus on the basal half. *Prothorax* very slightly narrowed at the basal angles, which are thus more rounded. *Scutellum* without a median carina. *Elytra* with the basal transverse depression somewhat deeper, so that the basal margin appears to be slightly raised, without any depression at the base of stria 6 between the humeral callus and the basal angle of the prothorax, the suture not raised on the declivity. *Legs* with the tooth on the hind femora narrower and sharper; the sinuation on the lower edge of the front tibiæ extending only to three-fifths from the base, the hind pair almost straight on the lower edge.

Length 7 mm., *breadth* 3.5 mm.

TANGANYIKA TERRITORY: Ukerewe I., Lake Victoria, 1 ♂, 3 ♀♀, xii.–ii. (*Father P. A. Conrads*). KENYA COLONY:

Homa, S. Kavirondo, 2 ♂♂, 2 ♀♀, xi.-xii. 1934 (*H. J. Allen Turner*—type).

Type ♂ in the British Museum.

Almetus nyikanus, sp. n.

♀. Coloured much like the preceding species, but the elytra with an indefinite broad macular brownish-black transverse band before the middle between striae 1 and 8, and an ill-defined pale humeral patch.

Rostrum of ♀ more strongly and closely punctate than in the two preceding species, and the median carina continued beyond the antennae in the form of an impunctate line. *Antennae* with joint 1 of the club much longer than 3. *Prothorax* with the uniform pale scaling on the pleurae much denser than the darker and more variegated scaling on the dorsum and separated from it by a fairly sharp line of demarcation, whereas in all the other species of the genus the pleural scaling is similar to and continuous with that on the dorsum. *Scutellum* without a median carina. *Elytra* more oblong than in the other species, being parallel-sided from the shoulders to the middle; the transverse basal depression extending from the scutellum to stria 6, narrower than in *sheppardi* and much shallower than in *nyanzæ*, stria 3 quite straight at the base (curved inwards in the two species just mentioned), interval 6 not depressed below the level of 4 at the base, the suture quite flat on the declivity. *Legs* with the tooth on the hind femora comparatively small; the sinuation on the lower edge of the front tibiae extending to three-fourths the length, the hind tibiae distinctly sinuate at the base. *Pygidium* without any median carina in the apical depression.

Length 5-6 mm., *breadth* 2.4-3.0 mm.

TANGANYIKA TERRITORY: Morogoro, 3 ♀♀, iv. 1926 (*A. H. Ritchie*).

Type ♀ in the British Museum.

Almetus capensis, sp. n.

♀. Colouring very similar to that of *A. sheppardi*, but paler owing to the grey spots on the striae of the elytra being much more numerous; the two dark patches at the base of the pronotum much closer together.

Rostrum of ♀ as in *A. nyikanus*. *Antennæ* with joint 1 of the club about as long as 3. *Prothorax* less transverse than in the other species, gently rounded laterally, not parallel-sided posteriorly but narrowed at the basal angles; the pleural scaling not differentiated from the dorsal. *Elytra* only slightly narrowing in the basal third, then more rapidly; the transverse basal depression shallow from the suture to stria 4, much deeper between striae 4 and 6, so that interval 6 at the base is depressed below 4 and 7, no depression between the humeral callus and the basal angle, interval 3 slightly raised in the middle, the suture not raised behind. *Legs* with the tooth on the hind femora triangular, its point being almost a right angle; front tibiae with the sinuation extending for about two-thirds of the length, hind tibiae sinuate at the base. *Pygidium* with the apical depression very shallow and without a median carina.

Length 6.5 mm., *breadth* 3.0 mm.

SOUTH AFRICA: Graham's Town, Cape Province, 1 ♀ (type); Cape, 1 ♀.

Type ♀ in the British Museum.

Almetus minor, sp. n.

♂♀. *Derm* piceous brown; pronotum with mainly dark brown scales and a very indefinite broad lenticular median stripe of paler scales, forming a denser patch on the median basal process, the pleuræ with dense pale scaling only on the lower half; elytra with rather evenly mingled brown and grey scales and a small pale spot at the apex of the suture; underside with dense pale scaling.

Rostrum of ♂ much less strongly curved than in the other species, almost parallel-sided, scarcely dilated at the apex, closely and strongly punctate, with the median carina and one of the lateral carinae continued nearly to the apex, without any distinct lateral sulcus, the lateral apical angle on the lower surface produced into a small tooth; rostrum of ♀ more slender, more dilated at base and apex, somewhat less strongly punctate, with the three carinae also continued almost to the apex. *Antennæ* with joint 1 of the club much longer than 3. *Prothorax* slightly rounded laterally, widest at the middle, otherwise as in *A. sheppardi*. *Elytra* less narrowed behind than in the other species, with the general surface more even,

the basal depression being very feeble or almost obsolete and the subapical calli much reduced, the suture not raised on the declivity, no depression in front of the shoulder, and stria 3 slightly curved at the base. *Legs* with the sinuation on the lower edge of the front tibiæ extending for two-thirds of the length, the hind tibiæ distinctly sinuate on the basal half. *Pygidium* with the apical depression deep and without any median carina, that of ♂ without lateral tufts of scales.

Length 3.5–4.0 mm., *breadth* 1.4–1.8 mm.

KENYA COLONY: Homa, S. Kavirondo, 5 ♂♂, 4 ♀♀, xi.–xii. 1934 (*H. J. Allen Turner*).

Type ♂ in the British Museum.

9. EURYOMMATUS Roger.

Genotype: *E. mariæ* Roger.

A purely Palæarctic genus containing only four species. I am much indebted to Dr. Walther Horn for a specimen of the genotype, a species not previously represented in English collections.

10. OSPHILIA Pasc.

This genus was founded by Pascoe for four species from the Malay Archipelago, and no type appears to have been fixed; I therefore select *O. apicalis* Pasc. (Borneo) as the genotype.

Up to date some 63 species have been assigned to this genus, occurring throughout the Ethiopian Region and across tropical Asia as far as the Moluccas. It appears to include some heterogeneous elements, but no revision is possible at present, as only about one-third of the species are known to me.

11. PYCNOSPILIUS, gen. nov.

Head, in lateral view, forming a shallow angle with the rostrum; eyes narrowly separated, not acuminate in front, with their lower margin above the level of the upper edge of the scrobes. *Rostrum* much longer than the head and prothorax in both sexes, only slightly curved, the lower edge being practically straight; scrobes extending almost to the apex, their upper edge continued to the base and forming the latero-ventral margin. *Antennæ* inserted behind the middle of the

rostrum in both sexes; scape rather slender, straight, gradually clavate, not nearly reaching the base of the rostrum; funicle about as long as the scape, with joint 1 much longer than 2; club fusiform, acuminate, with joint 1 longer than 3. *Prothorax* transverse, strongly narrowed in front, with the apex much higher than the base, without any apical constriction, the base deeply bisinuate, the median lobe being angularly excised, the basal angles rounded. *Scutellum* small, round, without lateral sulci. *Elytra* very short and broad, widest behind the shoulders, jointly truncate at the apex, the sutural area depressed in the basal half, but without any transverse sub-basal impression, the posterior calli obtuse, the lateral margins arcuate; the striae narrow and finely punctate, stria 1 ceasing behind the scutellum. *Legs* very short, the hind femora not nearly reaching the apex of the elytra, the front pair not thicker than the hind and with a rather smaller sharper tooth; front tibiae arcuate dorsally, the deep sinuation on the lower edge occupying three-fourths of the length; tarsi very short, joint 1 of hind pair not longer than 2+3, claws simple and divaricate. *Sternum* with the prosternum anteriorly almost vertical and much longer than a coxa; mesosternal process vertical, truncate, about as broad as a coxa; mesepimera about as large as the mesepisterna, the suture between them visible only on its posterior half; metepisterna broad, nearly parallel-sided. *Abdomen* with the pygidium covered; ventrite 2 behind the coxae about as long as the metasternum between the coxae and shorter than ventrite 1, the posterior angles of 2-4 produced backwards.

Genotype: *Osphilia subrectirostris* Hust. 1937.

The species upon which the genus is based looks like a small, very rotund *Osphilia*, but the nearly straight rostrum, the short metasternum, and the comparatively small tooth on the front femora, will readily distinguish it. It has been kindly identified for me by Mr. Hustache, who further informs me that *Osphilia hoplocturoides* Hust. 1937 also belongs to this genus.

12. PANOPTES Gerst.

Genotype: *P. notatus* Gerst. (Madagascar).

Thanks to the kindness of Dr. Kuntzen, I have been able to examine Gerstaecker's type (a ♂), which still remains the only known specimen of the genus.

Some of the characters given by Faust (Stett. Ent. Zg. 1883, p. 480), based on information supplied to him, prove to be incorrect, and the following points will serve to amplify Gerstaecker's description.

Head with the eyes contiguous throughout their length, not acuminate in front, their lower margin straight and in a line with the upper edge of the scrobe. *Rostrum* widening at both base and apex. *Antennæ* inserted at a little behind the middle of the rostrum, the scape very slender and abruptly clavate; basal joint of club as long as the rest together. *Scutellum* with a sulcus on each side. *Elytra* with the suture depressed at the base and with a deep transverse sub-basal impression, stria 1 ceasing behind the scutellum. *Legs* with the hind femora very long, exceeding the body by nearly half their length; front tibiæ slender and with their dorsal edge straight on the apical two-thirds, the fringe of setæ adjoining the corbels on the posterior pairs ascending the dorsal edge of the tibia, the tibial mucros obsolete. *Sternum* with the prosternum anteriorly much longer than a coxa; mesepimera larger than the mesepisterna; metasternum much longer than ventrite 1 behind the coxæ, metepisterna parallel-sided. *Abdomen* with the pygidium covered; ventrite 1 as long as 2 behind the coxæ, 2 shorter than 3+4; intercoxal process as broad as a coxa, angulate (not truncate).

13. ANCHISTOSPILIA Heller.

Genotype: *A. decorata* Hllr. (West Africa).

Only two other species have been recorded, both of which are also West African.

14. TYRIOTYDEUS Hust.

Genotype: *T. albolateralis* Hust. (West Africa).

The second species, *T. compressirostris* Hust., also from West Africa, is unknown to me.

15. EMBEXAURE Pascoe.

Genotype: *E. gallinula* Pasc. (Borneo).

In the Catalogue of Zygopinae this genus is erroneously recorded as *Exemaure*.

Dr. Heller has kindly given me a cotype of his *E. constricta* from Malacca; but this species does not belong

to the Coryssomerini as here defined and must be transferred to the genus *Rimboda* Hllr. From the descriptions and figures it seems sufficiently certain that the four species of *Emexaure* recorded in the Catalogue from the Philippines also belong to the genus *Rimboda*, so that *Emexaure* becomes again monotypic.

16. LAMYRUS Schönh.

Genotype: *L. bohemani* Fhs. (South Africa).

As explained above, this genus has hitherto been entirely misinterpreted. The only other described species that can be assigned to it with certainty is *Phacemastix erythreensis* Hust.

17. AMPHIBLEPTUS, gen. nov.

Head not constricted behind the eyes, which are only narrowly separated and have their lower margin on a level with the upper edge of the scrobes. *Rostrum* with the scrobes not extending beyond the antennæ (except in *trinotatus* Mshl.). *Antennæ* inserted at or beyond the middle of the rostrum, with the club shorter than the funicle. *Elytra* with stria 1 not reaching the base, the lateral margins more or less sinuate. *Legs* with all the femora of about the same size and with a similar sharp tooth, the hind pair not nearly reaching the apex of the elytra; front tibiæ straight dorsally; tarsal claws simple. *Sternum* with the prosternum anteriorly not longer than a coxa; mesosternal process somewhat narrower than a coxa, the suture between the mesepisterna and mesepimera obsolete. *Abdomen* with the pygidium covered; the apical angles of ventrite 2 produced backwards.

Genotype: *Phacemastix poultoni* Mshl. (East Africa).

Three other species must be transferred to this genus, namely, *Osphilia multiguttata* Hust. 1934, *Phacemastix bimaculata* Hust. 1935, and *Phacemastix trinotata* Mshl. ♀; the ♂ that was erroneously attributed to the last species is described below as a new species of *Lamyrodes*.

Phacemastix elegans Hust., of which a cotype was kindly lent to me by its author, also belongs to this genus, being apparently a local race of the genotype. The typical form of *elegans* has a very different appearance

from *poultoni*, but there is in the British Museum a series of six specimens from Elizabethville, Belgian Congo (*Dr. Silvester Evans*), which exhibit an almost complete intergradation between the two forms.

The six species comprised in the genus can be distinguished as follows :—

Key to the Species of Amphibleptus.

- 1 (12). Rostrum not or but slightly widening basally, its dorsal portion compressed and elevated at the base; lateral margin of elytra deeply sinuate, humeral callus strongly punctate throughout; elytra without conspicuous spots of dense scaling on disk, but with a large basal patch or band on each side of scutellum.
- 2 (9). Front tibiæ not carinate on externo-dorsal edge; metasternum and ventrite 1 of male with normal scales in the middle; femora of male with short recumbent setæ beneath.
- 3 (6). Elytra with the derm red and a black band at base and apex; pronotum without any dense patch of scales in middle of base; propleuræ with sparse narrow pale or black scales; tibiæ with a mucro, front pair with the lower edge straight on the apical half.
- 4 (5). Elytra with a well-defined basal band of broad pale scales from the scutellum to the lateral margin, the scales being elongate and concealing striæ 2-4 at the base, and with a common band of similar scales across the top of the declivity, the scales on the intervening area sparse and setiform; punctures in striæ on elytra deeper; pronotum mainly with black scales, those on the declivity of elytra almost entirely black. *poultoni* Mshl.
- 5 (4). Elytra evenly clothed throughout with short setiform pale scales, except for a few broader scales at the base of intervals 2-4, and with no transverse band behind; punctures in striæ on elytra shallower; pronotum and declivity of elytra with pale scales only [Hust.
poultoni elegans
- 6 (3). Elytra with the derm entirely black; pronotum with an elongate patch of dense yellowish scales in middle of base; propleuræ with dense broad whitish scales on lower half; tibiæ

- without a mucro, front pair with the lower edge arcuate on the apical half.
- 7 (8). Pale scales on propleuræ extending broadly upwards on anterior half; antennæ black; pronotum without any impunctate median line; tibiæ deeply sinuate below on basal half; length 3.5-4.5 mm. *metialmodes*, sp. n.
- 8 (7). Pale scales on propleuræ confined to the lower half, the upper edge of the patch straight; antennæ red-brown; pronotum with an impunctate median line on anterior half; tibiæ shallowly sinuate beneath; length 6 mm. *sobrinus*, sp. n.
- 9 (2). Front tibiæ carinate on externo-dorsal edge; metasternum and ventrite 1 of ♂ with plumose scaling in the middle; femora of ♂ with long sub-erect setæ beneath; elytra with a dense subquadrate patch of broad pale scales at the base of intervals 2-4.
- 10 (11). Elytra with a deep transverse impression at the base, humeral callus prominent, with a depression between it and the basal angle; rostrum closely and strongly punctate on the apical half, scrobes not continued beyond antennæ; anal ventrite clothed with setiform scales only; length 7.5-8.5 mm. *bimaculatus* Hust.
- 11 (10). Elytra not or very shallowly impressed at the base, humeral callus flat, without any depression in front of it; rostrum finely and sparsely punctate on the apical half in both sexes, scrobes continued beyond antennæ; anal ventrite clothed mainly with broad scales; length 4.5-5.5 mm. *trinotatus* Mshl.
- 12 (1). Rostrum markedly widening basally, its dorsal portion not compressed or elevated at base; lateral margin of elytra shallowly sinuate, humeral callus impunctate in the middle; elytra with numerous spots of dense white scales, but those adjoining the scutellum not larger than the others; pronotum with nine patches of white scales *multiguttatus* Hust.

Amphibleptus metialmodes, sp. n.

♂. Derm black; pronotum with a dense elongate patch of broad yellowish or whitish scales in the middle of the base, the rest of the surface with black scales except for a few scattered narrow white scales, which form an indefinite narrow median stripe on the anterior

third, followed by two small admedian spots behind the middle, and some sparse scales laterally; elytra with black scales and numerous narrow white ones which often form irregular transverse bands, and a circumscutellar marking of dense broad yellowish or whitish scales, forming a quadrate patch at the base of intervals 3 and 4, those on 2 extending further backwards and ending on a level with a small spot at the base of 1, and finally an elongate subapical patch of dense narrow white scales on the suture; underside with dense broad yellowish scales throughout except for the following black or dark brown markings: a patch in front of the median coxæ, a small spot on the upper edge of the metepisterna, two large patches on ventrite 5, a lateral spot on 2, and often the posterior half of the median depression on ventrite 1; the dense patch of pale scaling on the lower half of the propleuræ extending broadly upwards on the anterior margin.

Head with the eyes closely approximated and acuminate anteriorly, the lower margin feebly sinuate. *Rostrum* not very stout, parallel-sided at the base, narrowed and laterally sinuate beyond the antennæ, rugosely punctate in the basal half and there with a well-marked narrow median carina and two sinuous ones on each side, apical half with fine close punctation; scrobes not extending anteriorly. *Antennæ* black, inserted at the middle of the rostrum; club rather large, as long as the last five joints of the funicle. *Prothorax* as long as broad, widest at the base, gradually narrowing in front with the sides almost straight, then curving in to the apical constriction without any pronounced shoulder; the dorsum finely and densely punctate, without any trace of a smooth median line. *Scutellum* slightly transverse, black. *Elytra* without any transverse basal impression and the post-scutellar depression only slight, the humeral calli much reduced. *Legs* black, with only the uncus and claw joint red-brown, clothed with fairly dense narrow grey scales, the hind femora with a broad black band, the tibiæ with the apex and a spot above the middle black; femora with the external carina feeble or obsolescent, the sharp triangular tooth of about the same size on all pairs; tibiæ without a mucro, the lower edge of the anterior pairs sinuate on its apical half.

Length 3.5–4.5 mm., *breadth* 1.5–2.1 mm.

CAPE PROVINCE: Katberg, 4000 ft., 6 ♂♂, x.–xi. 1932 (R. E. Turner).

Type in the British Museum.

Amphibleptus sobrinus, sp. n.

♀. Colouring as in *A. metialmodes*, except that the pale scaling on the propleuræ is confined to the lower half and does not extend upwards at the apex, and there is no dark lateral spot on ventrite 2.

Agreeing with the description of *A. metialmodes* except as follows:—*Rostrum* slightly widening at the base, gradually and not abruptly narrowed beyond the antennæ, and not much dilated at the apex, so that the sides are not sinuate anteriorly. *Prothorax* more abruptly narrowed in front so as to form a distinct shoulder, and with an abbreviated impunctate median line. *Elytra* with a very slight transverse basal impression and the suture more depressed behind the scutellum. *Legs* with the femoral tooth narrower and sharper; tibiæ much more shallowly sinuate beneath.

Length 6 mm., *breadth* 2.7 mm.

N. RHODESIA: Kashitu, near Broken Hill, 2 ♀♀, xii. 1914, i. 1915 (H. C. Dollman).

Type in the British Museum.

These two species differ from all their congeners in the shape of the anterior tibiæ, the absence of a tibial mucro, the reduction of the humeral calli, and in the presence of a large patch of scaling in the middle of the base of the pronotum.

18. LAMYRODES, gen. nov.

Head very shallowly constricted just behind the eyes, which are distinctly separated, with their lower margin on a level with the upper edge of the scrobe and straight or feebly arcuate. *Rostrum* with the scrobes continued deeply beyond the antennæ. *Antennæ* inserted at or behind the middle of the rostrum, the funicle with joints 4–7 transverse. *Elytra*, in dorsal view, distinctly sinuate behind the shoulders; stria 1 not reaching the base, but ceasing behind the scutellum, the lateral margins deeply sinuate above the metasternum. *Legs* with all the femora of about the same thickness and with a

similar, sharp tooth, the hind pair not nearly reaching the apex of the elytra; front tibiæ curved near the base but straight distally; tarsal claws appendiculate. *Sternum* with the prosternum anteriorly longer than a coxa; mesosternal process about as wide as a coxa, mesepimera as large as the mesepisterna. *Abdomen* with the pygidium covered; ventrite 2 shorter than 1 behind the coxa and as long as 3+4, its apical angles produced backwards.

Genotype: *Baridius melaleucus* Fairm. (East Africa).

I am greatly indebted to Dr. R. Jeannel for permission to examine the type of *Baridius melaleucus* Fairm. 1887, which proves to be a *Lamyrodes*, and *Panoptidius meleagris* Fst. 1899 is a synonym of it.

Baridius tigrinus Boh., from Natal, must be included in this genus, as well as two species that were ascribed to *Phacemastix*, namely, *pardalis* Mshl. and *kaokoensis* Hesse.

Mr. A. Hustache has very kindly allowed me to examine cotypes of his *Phacemastix nodieri* and *angolanus*; the former is undoubtedly conspecific with *kaokoensis* and the latter with *tigrinus*.

The five species of this genus may be distinguished as follows:—

Key to the Species of Lamyrodes.

- 1 (6). Rostrum with a high strong median carina; pronotum without any smooth median line; markings on upper surface of white scales without yellow patches; antennal club shorter than the funicle.
- 2 (5). Elytra with interval 4 much narrower than 3 or 5, the punctures in the striae very large and deep, three or four times as large as those on the pronotum.
- 3 (4). Forehead in the posterior part separated from the margins of the eyes by a short raised carina, the median carina disappearing in the posterior third; the basal white patch on the elytra confined to intervals 3 and 4, the humeral white patch not extending inwards beyond stria 6 *melaleucus* Fairm.
- 4 (3). Forehead without lateral carinae posteriorly, the median carina extending backwards to the hind margin of the eyes; the basal white patch on the elytra covering intervals 2-4, the

- humeral patch reaching stria 5 or even 4..... *pardalis* Mshl.
- 5 (2). Elytra with interval 4 not narrower than 3 or 5, the punctures in the striae not or but little larger than the largest punctures on the pronotum .. *kaokoensis* Hesse.
- 6 (1). Rostrum with the median carina not elevated; pronotum with an abbreviated smooth median line; some of the dorsal markings yellow.
- 7 (8). Median carina on rostrum not ascending the forehead, which is much narrower than the antennal club, the temples nearly as long as the short diameter of the eyes; antennae inserted behind the middle of the rostrum in both sexes, club longer than the funicle; pronotum with conspicuous spots of dense white or yellow scales; elytra with numerous spots of dense white scales and a larger round patch on each side of the scutellum in which the scales are yellow internally and white externally *tigrinus* Boh.
- 8 (7). Median carina on rostrum ascending the forehead almost to the hind margin of the eyes, forehead about as broad as the antennal club, temples much shorter than the short diameter of the eyes; antennae at the middle of the rostrum in both sexes, club much shorter than the funicle; pronotum without any spots of dense scales; elytra without white spots, the yellow patches adjoining the scutellum quadrate *deceptor*, sp. n.

Lamyrodes deceptor, sp. n.

♂♀. Derm black, rather thinly clothed with short setiform, mixed black and grey scales, those in the middle of the pronotum being longer but not wider than those on the elytra; elytra with a dense subquadrate patch of broader yellow scales at the base of intervals 2-4, the portion on interval 3 being a little shorter than the others, a small yellowish spot on the posterior calli, a short grey patch at the apex of interval 1 and a longer black patch immediately in front of it; underside with a broad lateral stripe of dense cream-coloured scales throughout, enclosing a broad black stripe in the middle of the mesosternal side-pieces and a short narrow black stripe on the upper edge of the basal half of the metepisterna, and with an isolated yellowish patch on the anterior margin of the prosternum.

Head with the eyes rather widely separated, the space between them about as wide as the antennal club and rather deeply depressed, containing a median carina that nearly reaches the hind margin of the eyes, the vertex lower than the upper margin of the eyes. *Rostrum* much shorter than the pronotum, strongly curved, stout, parallel-sided and not compressed in the basal half, very similar in the two sexes, less narrowed dorso-ventrally than usual and only slightly widened at the apex, rugosely punctate on the basal half, with a low narrow median carina (not elevated as in the genotype) and two more irregular carinae on each side. *Prothorax* as long as broad, with the sides almost straight and gradually narrowing from the rounded posterior angles for three-fourths of the length, then rapidly narrowing to the short apical constriction; the dorsum almost flat longitudinally, with fine densely rugulose punctation leaving a rather broad abbreviated smooth median line. *Elytra* only very slightly wider at the shoulders than the prothorax, feebly sinuate behind the shoulders and gradually narrowing posteriorly; the deep striae about as wide as the intervals, the deep punctures in them not very much larger than the largest punctures on the pronotum; the intervals rugulose, with intermingled subrecumbent setiform black and grey scales, which do not conceal the derm, the grey ones not being broader than the black. *Legs* rather stout, piceous brown, evenly clothed with rather sparse setiform whitish scales; front tibiae deeply sinuate beneath on the basal half.

Length 4.0–4.6 mm., breadth 1.6–2.0 mm.

S. RHODESIA: Salisbury, 1 ♂, viii. 1898, 1 ♀ (type), xii. 1898, under bark (*G. A. K. Marshall*).

Type ♀ in the British Museum.

Erroneously recorded previously as the male of *Amphibleptus* ("Phacemastix") *trinotatus* Mshl. (Proc. Zool. Soc. Lond. 1906 (1907), p. 940).

19. PHACEMASTIX Schönh.

Genotype: *P. baridioides* Fhs. (Natal).

As here restricted, the genus contains only one other species, *P. picta* Hesse, which ranges from the Transvaal to Tanganyika.

20. SYNOPHTHALMUS Lac.

Genotype : *Phytophilus crucifer* Gyll. (Philippines)

As indicated above, *Heurippa* Pasc. is a synonym of this genus, and *H. amoena* Pasc., from Celebes, and *H. x-album* Heller, from Formosa, must be transferred to it. *Synophthalmus schönherri* Boh. is now referred to the following genus.

21. ANASCOPUS Mshl. 1935.

Genotype : *Phytophilus schönherri* Boh. (S. Africa).

This genus is at present monotypic, and both *Anascopus angustus* Mshl. 1935 and *Osphilia subulirostris* Hust. 1936 are synonyms of the genotype.

22. TYRIOTES Pasc.

Genotype : *T. cuneipennis* Pasc. (West Africa).

Another monotypic genus.

II.—*Himalayan Mayflies (Ephemeroptera) **.

By JAY R. TRAVER.

THE mayflies described in this article were collected in 1932 by the Yale North India Expedition, under the direction of Prof. G. E. Hutchinson. These specimens are largely from Kashmir and Indian Tibet (Ladak). One new genus and five new species are recognizable. Much of the material is in rather poor condition. Other new species may be present but are represented by immature stages (nymph or subimago) only, or are too fragmentary to permit of description. The two species of Heptagenine nymphs designated as "single-spine" and "double-spine" allies of the genus *Iron* probably represent new genera.

Relatively little is known of the Ephemeroptera of the Himalayan region. Eaton (1) mentions the occurrence of four genera : *Leptophlebia marginata* L., from the vicinity of Taschkent ; *Epeorus psi* Etn., from Kooloo, Himalaya ; *Pægniodes* and *Ecdyonurus*, from Tibet and Himalaya respectively. McLachlan (2) lists the genera

* This paper belongs to the "Scientific Results of the Yale North India Expedition : Biological Report, number 26."

Bætis, *Clæon*, *Heptagenia*, *Siphonurus*, *Leptophlebia marginata* L., and *Centroptilum*, from Turkestan; he designates no other species. Ulmer (3) has described a new species of *Cinygma* (*Cinygma asiaticum*), from Djarkent, and reports (4) *Clæon inscriptum* Bgtss., from the vicinity of Srinagar. Tshernova (5) has described two new species—*Heptagenia tadzhikorum* Tsh. and *Clæon zimini* Tsh.—from southern Buchara and the vicinity of Taschkent. To date, the work of Brodsky (6) has added most to our knowledge of the mayfly fauna of this interesting region. In his paper on the mayflies of middle Asia sixteen new species are described, and three others listed as occurring in that area. Several of these are from Samarkand or Taschkent, many others from the River Issyk. I am unable to recognize any of the species previously reported from the Himalayan region in the material collected by the Yale North India Expedition.

Family Heptageniidae.

Genus OROBOTSIA, nov.

Imago (female). *Frontal portion of head greatly enlarged* (fig. 5). Only fragments of wings remain; in these stigmatic cross-veins are not anastomosed. Tarsi five-jointed. In all legs tibia as long as or slightly longer than femur; tarsus three-quarters of tibia in fore leg, half or slightly less than half of tibia in middle and hind legs. *Claws on all legs similar, sharp-pointed*; one claw of each pair slightly wider at base than the other (fig. 7). In fore leg basal tarsal joint about three-quarters of the second and subequal to third; fourth slightly shorter than basal joint; distal joint longest, about equal to third and fourth combined; second very slightly shorter than distal (fig. 1). In middle and hind legs basal joint of tarsus subequal to second; third and fourth progressively shorter; distal joint longest, approximately equal to basal and second joints combined. Subanal plate with a V-shaped median cleft on apical margin.

Nymph (mature). Outline of head of subimago, and the similar sharp-pointed claws on each tarsus, visible through the nymphal cuticle. Typical Heptagenine venation (determined by removing wing of subimago from nymphal wing-pad). Cross-veins at bulla 2, 2, 2 in

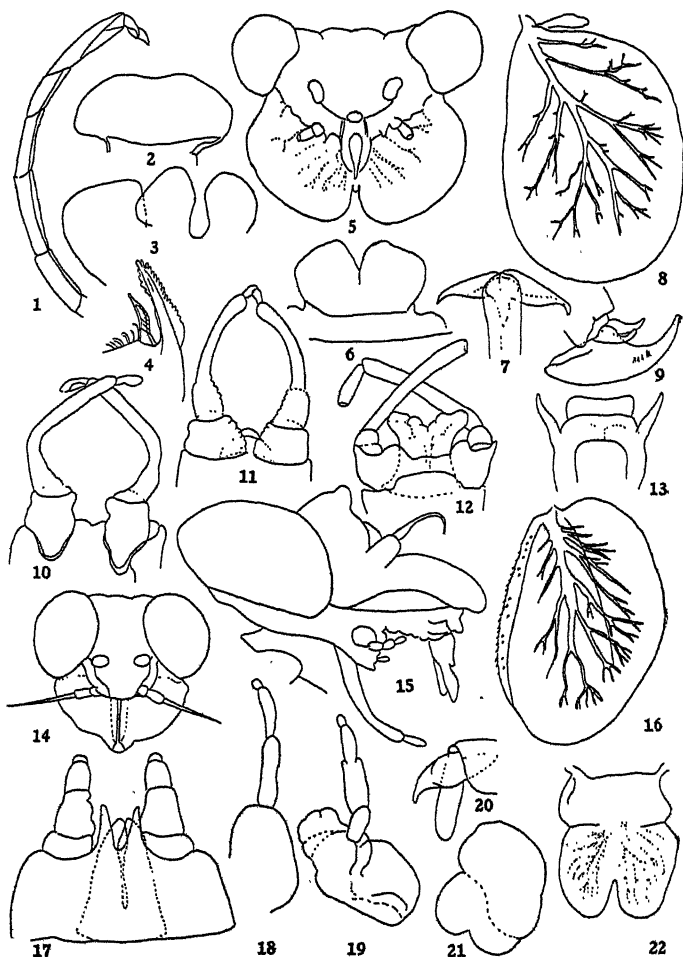
first three spaces; in fourth space 2 nearer apex than those in space above; in fifth space 1 well developed and 1 barely indicated; in sixth space, two cross-veins. Frontal border of head distinctly emarginate at median line. Mouth-parts reminiscent of *Cinygmula*. Gills likewise quite similar to those of *Cinygmula* in that the fibrillar portion is much reduced (fig. 8). Tibiæ equal to or exceeding femora in length; tarsi short, each only slightly more than one-third the length of the corresponding tibia. Claws with five pectinations. A few very short inconspicuous hairs and spines on posterior margins of femora. Tails three (broken, except at base).

A single female imago; wings fragmentary; six legs, unattached, in vial with specimen. Three mature nymphs which, by reason of the subimaginal head and claws visible through the cuticle, evidently belong with the above imago. Distinct from all other genera of this family by reason of the greatly produced frontal portion of the head and the similar sharp-pointed claws. Probably allied to *Cinygmula*.

Genotype: *Ororotsia hutchinsoni*, sp. n.

Ororotsia hutchinsoni, sp. n.

Female imago. Body 10 mm.; wing 11 mm.; tails 15 mm. Head dark olive-brown. Eyes set at outer angles of head (fig. 1). Antennæ broken. Thorax dark red-brown. Medio-lateral areas of pronotum shaded with darker brown. Antero-lateral, posterior, and postero-lateral margins (below scutellum) of mesonotum blackish. Posterior half of mesosternum dark red-brown, other portions lighter red-brown. Legs dark olive-brown; fore legs distinctly tinged with red-brown. A narrow black line along front margin of fore femur. On middle and hind legs tarsi faintly tinged with red-brown, slightly darker than other segments. Wings hyaline; venation reddish brown. Cross-veins somewhat heavier than longitudinals. In costal space before bulla 5 or 6 cross-veins, slightly aslant; in basal subcostal space 5 or 6 cross-veins. A reddish-brown stain in stigmatic area, filling costal and subcostal spaces. 9 to 12 stigmatic cross-veins; simple, slightly aslant. 7 or 8 subcostals in corresponding space. A distinct dark brown stain at extreme bases of both fore and hind wings. Humeral



Figs. 1-9.—*Ororotsia hutchinsoni*. 1. Fore tarsus, female imago. 2. Labrum of nymph (all hairs omitted). 3. Glossa and paraglossa of nymph (hairs omitted). 4. Canines of mandibles, nymph. 5. Head of female imago. 6. Penes, male nymph. 7. Claws, hind tarsus of female imago. 8. Gill from middle abdominal segment, nymph. 9. Claw, fore leg of nymph (broken off to expose similar paired claws of subimago).

Fig. 10.—*Bæthella ladakæ*. Male genitalia.

Fig. 11.—*Oleon kashmiri*. Male genitalia.

Fig. 12.—*Epeorus* sp. Male genitalia.

Fig. 13.—*Ocenis srinagari*. Genitalia, male subimago.

Figs. 14-22.—*Ameletus primitivus*. 14. Head of female imago. 15. Same, lateral aspect, to show mouth-parts. 16. Gill of fourth abdominal segment, nymph. 17. Genitalia, male nymph. 18. Labial palpus, female imago. 19. Maxillary palpus, female subimago. 20. Claws of female imago. 21. Mandible, female subimago. 22. Labrum, female imago.

cross-vein dark red-brown, blackish at crossing of subcosta.

Abdomen light red-brown. Tergite 1 shaded obscurely with greyish black. Tergites 9 and 10 olive-brown. Posterior margins of tergites 7-10 very narrowly dark brown. A narrow, pale, median stripe is faintly indicated. Traces of obscure, darker, submedian streaks on tergites 8-10. Intersegmental area and pleural fold greyish. Sternites very slightly paler than tergites. Egg-valve outlined in dark brown. Oviducts appear as faint, dark, submedian streaks parallel to and near the pleural fold. A wide, V-shaped, median cleft on apical margin of subanal plate. Tails red-brown; a pale, opaque ring at each joining.

Locality: L 52. Ororotse Tso; on ice at margin; July 11, 1932. Altitude 17,381 ft.

Nymph (mature). Body of female 12 mm.; tails broken. General colour dark red-brown. Mouth-parts much as in *Cinygmula* (figs. 2, 3, & 4). Frontal margin of head deeply emarginate at median line. Pronotum widest just behind anterior margin; its length is greater on each side than at median line. Proportions of leg-joints as indicated in generic description; claw shown in fig. 9. Legs reddish brown. Dorsal surface of femur finely set with many very short spinules. Femoral flange rather short, conical. The five-jointed, sharp-clawed legs of the subimago are plainly visible within the nymphal leg (fig. 9). A few short weak spines on posterior margin of each femur. Wings of subimago, removed from nymphal wing-cases, exhibit typical Heptagenine venation. In hind wing costal angulation moderately acute; median vein forked near base; radial sector normal. In both wings cross-veins are slightly infuscated, distinctly so in the costal margin. Very short postero-lateral spines on middle abdominal segments only. Each basal and middle tergite marked with a pair of pale submedian streaks, almost straight, extending from anterior margin about to the middle of the tergite; a round pale spot at end of each streak. On middle tergites pale streaks laterad of these markings, next to bases of gills, are faintly indicated. Median area of middle and apical tergites indistinctly paler. Tergite 9 rather paler than other tergites; two short, dark, sub-

median streaks. Venter without distinct markings; however, a narrow, dark, lateral line near pleural fold may be faintly indicated. Tails broken. Gills greyish. Tracheation brownish; appears almost palmate (fig. 8). Fibrillar portion reduced to one short filament (not seen on all gills). As gills were lying at bottom of vial, unattached to bodies of nymphs, it is not possible to determine to which segment each belonged.

Locality: L 26-27, below Polu Digar; June 21, 1932. Three mature female nymphs.

A younger male nymph from L 34 is probably of the same species. In this younger specimen the upper surfaces of the femora are distinctly yellow in median area; narrow dark lines enclose this pale area, converging apically to form a wide dark streak. Distal third of each tarsus darker than preceding portions. Genitalia of this immature male nymph are shown in fig. 6.

Locality: L 34, Bao stream; June 25, 1932.

Holotype.—Female imago. L 52, Ororotse Tso; July 11, 1932. Yale North India Expedition. In private collection of the author.

Paratypes.—Three mature female nymphs. L. 26-27, below Polu Digar; June 21, 1932; and one male nymph, L 34, stream at Bao; June 25, 1932. In private collection of author.

Genus RHITHROGENA Eaton.

Rhithrogena sp.

Immature nymphs of this genus were collected at several stations. Apparently all are of the same species. One of the largest of these nymphs measures 12 mm. in length of body. No distinctive markings nor unusual coloration of body or gills are evident. Structurally the nymphs resemble European and Nearctic nymphs of this genus.

Localities:

K 57. Sind River, Kangan, Kashmir, 1810 m., under stones at edge; May 16, 1932, Alt. c. 5795 ft.

K 65. Sind River between Gund and Sonamarg. (a) Backwater, not more than 10 metres per minute under stones. (b) 20-50 metres per minute under stones; May 18, 1932. Alt. c. 8000 ft.

K 72. Matayan. Stream coming in at bridge from south. Under stones. 50 m. per minute. Temp. 2°-2 C. May 20, 1932. Alt. 10,430 ft.

L 6. Kalatse, stream; May 29, 1932. Alt. 9700 ft.

L 11. First stream east of Nurla; May 31, 1932. Alt. c. 9900 ft.

Attached by a few threads to the right side of the abdomen of the dorsum of one nymph from K 57 is the pupa of a species of *Simulium* *. The head of this pupa is directed toward the caudal end of the body of the mayfly nymph. Dr. Hutchinson states that his notes indicate an habitual relationship between the mayfly nymphs and the *Simulium* larvæ and pupæ. Thus, at Llabaps about one-third of the Heptagenine nymphs were found to carry larvæ or pupæ of the *Simulium*.

Genus *EPEORUS* Eaton.

Epeorus sp.

A single male imago in rather poor condition. Body 6 mm.; wings represented by a few small fragments only. General colour dark red-brown. Frontal margin of head paler. Eyes quite large, contiguous apically; lateral ocelli also large. Pro- and mesonota bright red-brown; posterior portion of mesonotum darker. Pleura paler and duller; thoracic sternum still paler, posterior half of mesosternum yellowish. Legs yellowish amber. Fore femur reddish brown; two indistinct darker bars, one near each end. Third femur tinged with reddish brown near apex. A very small black dot at apex of each trochanter. Fore tibia almost twice as long as femur; apex deep brown. Basal joint of fore tarsus three-quarters to seven-eighths as long as second and subequal to third; fourth and fifth joints progressively shorter than the third. Tarsus about one and a quarter times as long as tibia. Claws dissimilar. Tarsi on middle and hind legs missing. An opaque orange stain in stigmatic area of fore wing; a very small dark brown stain at extreme base of each wing. Abdomen rather bright red-brown; venter only

* Determined by Prof. O. A. Johannsen, Cornell University.

slightly paler than dorsum. Posterior third of each segment deeper brown, so that abdomen appears banded. Posterior margin of metanotum and of each of the two basal abdominal tergites narrowly black. Genitalia as in fig. 12. Tails deep red-brown at base, becoming paler distally; indistinctly darker at joinings in basal half.

Locality: L 31. Lhabaps; June 23, 1932. Alt. 11,855 ft.

This species appears to be distinct from all others thus far described from the Palearctic region in structure of genitalia.

Genus IRON Eaton.

Iron sp.

Three immature nymphs of a large species of this genus were taken, at one station only. Body of nymph 14 mm.; tails 13 mm. additional. Head widest near anterior margin. Labrum differs from that of typical *Iron* nymphs of the *longimanus* group in that it is distinctly widest at the anterior margin; almost straight across this margin, except for a median indentation; and the lateral margins slope distinctly inward toward the base. Femoral flange rather short and blunt. A small, rounded, purple-black spot on dorsal surface of each femur. Claws with two pectinations. Postero-lateral spines on abdominal segments 1-7 rather short, as in typical nymphs of the *longimanus* group. Gills of first pair unusually large, meeting beneath body of nymph and extending forward so as to cover most of the thoracic sternum. On each gill of the remaining pairs a much thickened oblong pad on the ventral surface of the anterior margin bears a short thumb-like projection. Thickened ventral area around outer margin quite prominent. Abdominal tergites reddish brown with conspicuous black markings: transverse band along anterior margin; black median triangle based on anterior margin, its apex not quite attaining the posterior margin; a rather broad, oblique, lateral band, from which a short streak extends toward the postero-lateral angle.

Locality: L 31. Lhabaps, under stones; June 22, 1932. Alt. 11, 855 ft.

*Allies of the Genus Iron.*A. "Single-spine" *Iron* ally.

Nymphs of this species were found at three stations. Body of one mature nymph, 9 mm.; tails 7 mm. additional. Mouth-parts as in typical *Iron* nymphs of the *longimanus* group. In general appearance quite similar to such nymphs, but bearing a row of mid-dorsal spines on abdomen. These spines are present on tergites 1-8; shortest on 1 and 8, longest on 4 and 5; each is directed backward. Head widest across the middle. Femoral flange short, obtuse; no dark spot on mid-dorsal surface of femur. Claws with two minute pectinations. Postero-lateral spines on abdominal segments 1-7 very short. Gills of first and last pairs meet beneath body of nymph. A very short rudiment of the middle tail is present. Entire body yellowish white except for paired brownish-black marks on each side of median line at anterior margins of abdominal segments 3-9. Described from nymph taken at L 46.

An immature nymph from L 6 has relatively longer and sharper mid-dorsal spines; general colour light reddish brown. Otherwise similar to specimens from L 46. Two small red-brown nymphs, immature, from L 31, have mid-dorsal spines similar to the L 46 nymph; femora with an oblong brownish mark on dorsal surface; ventral ganglia of thorax and abdomen darkened.

Localities:

L 6.. Stream at Kalatse; May 29, 1932. Alt. 9700 ft.

L 31. Lhabaps, under stones; June 23, 1932. Alt. 11,855 ft.

L 46. Stream just below Phobrang; July 8, 1932. Alt. 15,215 ft.

B. "Double-spine" *Iron* ally.

Nymphs of this species were taken at four stations. Mature nymph, body 11 mm.; tails 7 mm. additional. Aside from the dorsal spines quite similar to *Iron* nymphs of the *longimanus* group. Head widest across middle. Femoral flange short, obtuse. Dorsum of each femur largely brown, this colour interrupted by a dagger-shaped, whitish, median mark in basal half. Claws with three pectinations. Postero-lateral spines on abdominal segments 1-7 short. Thorax and abdomen reddish brown. Dark transverse marks on anterior margin of each tergite in median area. A pair of submedian spines on abdominal

segments 1-6; on tergites 7-9 a *single median spine*. Paired spines on tergite 1 very short, and separated by a space approximately equal to the length of the segment at middle line; those on 2 slightly longer but as widely separated. Progressively longer and closer together on tergites 3-6; on 5 spines touch at base, on 6 they are grown together basally. The single spines on tergites 7-9 are rather long and stout and directed backwards. Gills of first and last pairs meet beneath body of nymph. A very minute conical remnant of the middle tail is present. Described from specimen taken at K 57.

An immature nymph from K 65 differs from the above description in that the single spines are present on segments 8 and 9 only, while double spines occur on segments 2-7. The spines on 7 are grown together for at least half of their length.

A very young nymph from K 77 possesses paired dorsal spines on segments 2-9. From these discrepancies as to the number of paired and single spines borne by nymphs of different ages it seems probable that the three single spines present on segments 7-9 of the mature nymph have resulted from gradual fusion of closely placed paired spines, such as occur on the very young nymph.

Localities:

K 57. Sind River, Kangan, Kashmir, 1810 m. under stones at edge; May 16, 1932. Alt. c. 5795 ft.

K 65. Halfway between Gund and Sonamarg. (a) Backwater, not more than 10 m. per minute under stones. (b) Over 20 m. per sec. under stones. May 18, 1932. Alt. c. 8000 ft.

K 77. Dras stream; May 22, 1932. Alt. 10,144 ft.

L 11. Stream east of Nurla; May 31, 1932. Alt. c. 9900 ft.

It is probable that both the "single-spine" and the "double-spine" nymphs allied to *Iron* represent undescribed genera of the Heptageniidae.

Genus HEPTAGENIA Walsh.

Two nymphs taken by the expedition may be of this genus. The first, called *Heptagenia* sp. A, seems rather closely allied to the *flavescens-elegantula* group of Nearctic fauna; the second, designated as *Heptagenia* sp. B, is an ally of the *maculipennis* group.

Heptagenia sp. A.

A single half-grown female nymph. Body 9 mm.; tails 11mm. In type of mouth-parts very similar to the Nearctic species *H. marginalis* and *H. elegantula*. Differs from these and related species as regards the shape of the head; this is slightly emarginate at middle of frontal margin, quite distinctly narrowed toward the posterior margin, and with eyes set closer together and further back on the head, reminiscent of the genus *Iron*. Pronotum widest near anterior margin. Legs very large and long for size of body. Hind femur, when extended backwards, reaches to middle of ninth abdominal segment. A few short spines and a fringe of longer hairs on hind margin of each femur; many short spines on upper surface. Fringes of hairs on tibiae along posterior margins and along middle area of inner surface in distal portion. Fore tibia subequal to femur; hind tibia very slightly shorter than femur.

Gills present on segments 1-7. Filamentous portions well developed on all seven pairs; upper lamellate portions of all pairs are lacking from the single specimen. Subanal plate large, slightly emarginate at middle of apical margin. Tails three. General colour dark red-brown; tibiae, tarsi, and tails yellowish.

Locality: L 24. Edge of River Indus, Spithug; June 17, 1932. Alt. 10,730 ft.

Heptagenia sp. B.

A single nearly mature female nymph. Body 4 mm.; tails missing. Head large for size of body, as in nymphs of the Nearctic *maculipennis* group. Mouth-parts very similar to species of that group. Pronotum widest near middle. Claws pectinate, each bearing about four small spines near distal portion. Posterior margins of femora fringed with long hairs. Short postero-lateral spines present on abdominal segments 4-9. A single pair of gills remains, on segment 4. Filamentous lower portion well developed. Upper lamellate portion like wise well developed; rounded, somewhat wider than long, tracheation indistinct. General colour of body light red-brown; numerous small pale spots on head and thorax. Legs yellowish, with dark bands. Posterior

margins of abdominal tergites dark brown. Tips of wing-pads extend backwards as far as the seventh abdominal segment.

Locality: P 14. 4 metres north of Havelian, North-West Frontier Prov.; pool in stream bed; March 17, 1932. Alt. c. 3000 ft.

Family Bætidæ.

Subfamily SIPHILONURINÆ.

Genus AMELETUS Eaton.

Female imagos of the genus *Ameletus*, differing from all known species of this genus by reason of the persistent mouth-parts, were taken at two stations in Kyam. Female subimagos considered to be of the same species are from Phobrang. Nymphs, which because of the subimaginal mouth-parts visible beneath the last nymphal skin seem to be of the same species, were found at Kyam. These nymphs possess mouth-parts and gills typical of the genus *Ameletus*. There seems no reason to doubt that the imagos, subimagos, and nymphs are of the same species. The persistent mouth-parts of the winged stages indicate that the species is very primitive—indeed, it may be that *Ameletus primitivus* should be considered as primitive as *Tasmanophlebia* of New Zealand. It is doubtful, however, whether the mouth-parts of the imago and subimago can be considered functional.

Ameletus primitivus, sp. n.

Female imago. Body 17 mm.; wing 17 mm.; tails 20 mm. Head blackish brown; frontal shelf paler than vertex, with olive-brown tinge. Shaped as in fig. 14. Lateral view of head, showing persistent mouth-parts, in fig. 15. Labial palp and labrum shown in figs. 18 and 22. Antennæ concolorous with head. Lateral and posterior portions of pronotum greyish; median area dark brown. Meso- and metanota blackish brown. A wide greyish area on pleura, anterior to base of fore wing; intersegmental areas pale; remaining portions blackish brown. Prosternum pale brown. Meso- and metasterna a dark red-brown, somewhat paler than notum. Femora dark brown with olive tinge; hind

femur rather paler, with yellowish cast. Fore tibia concolorous with femur, tarsus paler red-brown. Second joint of fore tarsus longest; fourth the shortest; basal and third joints subequal, distal slightly longer than basal or third joints. Tibiæ of middle and hind legs yellowish; tarsi light red-brown. Hind tarsus slightly longer than tibia. In hind tarsus second joint longest, fourth shortest, third slightly longer than fourth, basal slightly longer than third, distal almost as long as second. Claws dissimilar on all tarsi (fig. 20).

Fore wing relatively wider than in Nearctic species of *Ameletus*; less narrowed at base. Humeral cross-vein not darkened; one or two faint folds in wing-membrane basad of this brace-vein may be present. In apical half of fore wing cross-veins are numerous and regularly spaced, as in species of *Ameletus* from eastern North America. (In most species from western North America, including the type-species, *A. subnotatus* Etn., these cross-veins are less numerous and arranged in irregular series so as to leave relatively large spaces between each series.) Vein M_2 definitely turns downward to meet Cu_1 , as in most species of *Ameletus* examined (in a few species the vein M_2 ends basally, with no definite tendency to turn either up or down). In the hind wing the costal angulation is low and rounded except in one wing examined; even in this wing it is much less acute than is typical for species of Nearctic *Ameletus*. Stigmatic cross-veins of fore wing partially anastomosed, forming two short rows of cells, of which the row nearer the costal margin is the smaller. Costal and subcostal cross-veins very weak, almost obsolescent, in basal and middle areas of wing. Wings hyaline; venation yellowish brown. Both wings stained with dark brown at extreme base; on hind wing this brown stain may extend out on to the wing-membrane, in area behind the radial sector.

Abdominal segments 2-6 subhyaline; basal and apical segments opaque. Segment 1 largely blackish brown. Basal portions of tergites 2-10 yellowish with a distinct olive tinge; posterior half largely olive-brown. A darker brown triangular patch, its base near the posterior margin, occupies most of the median area of tergites 2-5; apex of each triangle almost attains the anterior margin,

where it may appear to be divided into two parts. On tergites 6-9 two olive-brown submedian streaks take the place of this triangle. On tergite 6 these streaks extend almost to the anterior margin; on tergites 7-9 they extend only about three-quarters the length of the segment. A brownish triangle occupies the postero-medial portion of tergite 10. Laterally on tergites 2-8 a dark streak parallels the pleural fold; postero-lateral angles brown. Sternites only slightly paler than tergites. Dark brown ganglionic patches on sternites 3-6. On each basal and middle sternite a pair of opaque, whitish, submedian streaks; on each basal sternite a pair of small, dark brown dots near middle area; antero-laterad of each dot a pair of small, comma-shaped, brown spots on each side. Subanal plate short, extending only about half the length of sternite 10; a V-shaped cleft at its apex. Tails reddish brown, paler distally; a pair of obscure brownish rings at each joining, not at all prominent. A very short, conical, unsegmented stub, not extending to the apical margin of segment 10, represents the rudimentary middle tail.

Localities :

L 61. Kyam; July 24, 1932. Found dead on surface of pool in swamp. Two specimens, wings of each badly torn. Alt. c. 15,500 ft. (Label in vial reads "K 61, Kiam," apparently in error.)

L 58. Kyam; July 20, 1932. Dead on surface of pool, hot spring. Fragments of two specimens. Alt. 15,630 ft.

L 59. Kyam; July 20, 1932. Rivulet under stones. Fragments of thorax and one pair of wings only. Evidently this adult had fallen into the water. Alt. 15,500 ft.

Female subimago. Body 17 mm.; wings and tails missing. One specimen; legs imperfect, wings missing except for a small basal area. It is probably the subimago of the above-described species. Very similar to imago except for differences noted. Mesonotum olive-brown. Two large greyish patches laterally on metanotum. Abdomen appears more distinctly banded dorsally than the imago, the dark posterior half of each tergite a more continuous dark band; median dark triangles less distinct; intersegmental areas pale, appearing

like a narrow grey band on posterior margin of each tergite. Dark ventral markings not yet developed. Labrum less well developed than in imago; labium and maxillæ somewhat better developed (figs. 19 and 21).

Locality: L 46. Stream just below Phobrang; July 8, 1932. Alt. 15,215 ft.

. Nymph. Body of male 17 mm.; of female 18 mm.; tails 6-7 mm. Two mature nymphs, male and female, probably belong to the same species as the adults just described. The outer cuticle came off readily from the head of the mature female nymph, revealing the persistent mouth-parts of the subimago; the subimaginal mouth-parts were also visible through the cuticle of the male nymph.

Head and thorax dark olive-brown; wing-pads and abdomen reddish brown; mesonotum tinged with reddish brown. Legs olive-brown. Femur and tibia of fore leg darker than other joints. Fore tarsus and tibiæ and tarsi of other legs yellowish brown; the distal end of each tarsus distinctly chestnut-brown. Claws light red-brown, darker at tips. Short postero-lateral spines on abdominal segments 2-9; those on middle segments slightly longer than apical ones. Basal segments of abdomen with a bluish-brown tinge; all other segments reddish brown. Median dorsal line narrowly pale; bordered on each side by a dark submedian streak not quite reaching the anterior margin; on middle tergites these dark streaks may become triangular. Lateral dark streaks or elongate patches on each tergite, halfway to pleural margin; posterior half of each tergite obscurely darker than other portions. A faint greyish median band extends the length of the abdomen ventrally. A comma-shaped whitish mark in antero-lateral angle of each sternite. Obscure pale, oblique, submedian streaks from anterior margin of each. Gills single, present on segments 1-7. Irregularly obovate, the inner margin being distinctly cordate. Outer margin thickened and bearing a few short spines; a narrow dark band across each gill, about one-third of distance from inner margin. Tracheation rather indistinct, profuse, tending toward a palmate condition; tracheæ look like a faint grey tracery. See fig. 16 for appearance of gill from

middle segment. Tails yellowish at extreme base and again at tip; elsewhere dark red-brown; joinings not darkened; no dark cross-bands. Genitalia of male nymph shown in fig. 17.

Locality: L 60. Kyam; July 25, 1932. Under stones in stream. Alt. 15,500 ft. Male and female nymphs, mature.

A single nymph from L 31 may be of the same species. Body 17 mm. General colour much as in the mature nymphs just described, but paler. Dorsal abdominal markings consist of distinct, oblique, dark brown streaks, extending from anterior margin; lateral dark streaks as in other specimens. Ventrally anterior margins of sternites narrowly dark brown; a small dark brown spot in antero-lateral angle of each.

Locality: L 31. Lhabaps; June 22, 1932. Under stones in a quiet pool in stream. Alt. 11,855 ft.

Holotype.—Female imago; L 61, Kyam; July 24, 1932. Yale North India Expedition. In private collection of the author.

Paratypes.—One female imago; same data as holotype. One female subimago; L 46, stream just below Phobrang; July 8, 1932. One male and one female nymph; L 60, Kyam; July 25, 1932. Yale North India Expedition. In private collection of author.

Ameletus sp.

A single immature nymph, probably representative of another species, was taken at L 47, stream below Chagra, on July 9, 1932. Alt. 16,331 ft.

Subfamily *EPHEMERELLINÆ*.

Genus *EPHEMERELLA* Walsh.

Ephemerella sp.

Immature nymph. Body 7 mm. A member of the *fuscata* group. Frontal shelf present, covering mouth-parts; notch on each side, into which bases of antennæ are fitted; a short blunt projection above base of each antenna on inner margin. Anterior to median ocellus a low rounded projection. Occipital tubercles present, moderate in size, conical. Surfaces of pro- and mesonota very irregular, but lacking true tubercles or spines;

a rounded protuberance, not a true tubercle, near middle of lateral margin of pronotum. Anterior margin of fore femur toothed or serrate; tibial spine blunt at tip, extends less than half the length of the tarsus. Posterior margins of femora of middle and hind legs with small serrations; a few fine serrations also on posterior margin of fore femur near base. Well developed, paired, submedian spines on tergites 2-9; the two rows of spines converge slightly toward the apical tergites. Short postero-lateral spines on middle and apical segments, those on segment 8 concealed apically on margin of tergite. Gills present on segments 3-7; none are operculate. General colour of body light red-brown. Irregular darker mottling on thoracic notum. A dark longitudinal line follows the inner margin of gills on middle tergites. Ventrally large, black, irregular blotches mark each thoracic ganglion; smaller rounded, dark blotches over the basal and middle ganglia of abdominal sternites. Tails missing, except short basal stubs.

Locality: L 11. Stream east of Nurla; May 31, 1932. One specimen. Alt. c. 9900 ft.

Subfamily CÆNINÆ.

Genus CÆNIS Stephens.

Cænis srinagari, sp. n.

Male subimago. Body 3 mm.; wing 3 mm. Frontal margin of head marked with yellow; all other portions dark red-brown with dusky shading. Thoracic notum, large areas on pleura, and lateral portions of sternum dark red-brown; median area of sternum yellowish. Fore femur light red-brown. Remainder of fore leg and all of middle and hind legs yellow; no dark markings. Abdomen yellowish. On each basal and middle tergite a large, blackish, rectangular patch on each side of pale median line. On apical tergites lateral extensions from these dark patches reach the pleural fold and extend along it for part or all of its length. Fine pale dots are sprinkled over the dark areas on apical tergites. Tergite 10 red-brown; lateral dark patches in postero-lateral angles only; median line black, divided into a Y apically. Sternites yellow. Tails deep yellow. Genitalia as in fig. 13.

Locality: Gagirbal, Srinagar; April 9, 1932.

Female imago. Body $3\frac{1}{2}$ mm.; wing $3\frac{1}{2}$ mm. Head as in male; antennæ yellowish brown. Pronotum light red-brown, heavily shaded with blackish. Mesonotum and pleura as in male; sternum yellowish. Legs yellow, no dark markings. Entire middle area of abdominal tergites overlaid with purplish black, leaving median line, intersegmental areas, and lateral margins yellow. No evident dark stigmatic markings, but traces of grey shading laterally on apical tergites. Sternites yellow. Tails yellow, light red-brown at extreme base.

Locality: Gagirbal Pond; April 11, 1932. Two specimens.

Holotype.—Male subimago. Gagirbal, Srinagar; April 9, 1932. Yale North India Expedition. In private collection of the author.

Allotype.—Female imago. Gagirbal Pond, Srinagar; April 11, 1932. Yale North India Expedition. In private collection of author.

Paratype.—Female imago; same data as allotype. In private collection of author.

In type of genitalia this species resembles the European *C. macrura* Steph., but is considerably smaller. It is slightly smaller than *Cænis ulmeri* Brod. (7), and differs from that species in the much greater length of the forceps. *C. ulmeri*, however, occurs in Taschkent, not far from Gagirbal.

Subfamily BÆTINÆ.

Genus BÆTIS Leach.

The material representing this genus is inadequate in every case for specific determination. A single male imago is present but in a very fragmentary condition, the wings being almost completely lacking. Two female imagos, one minus wings and tails, might by reason of their large size belong to the species *B. heptapotamicus* Brod. (8) or *B. thermicus* Ueno (9). However, the hind wing of the larger specimen does not accord well with that of either of the above-mentioned species. Several mature nymphs were taken but were not associated with the imagos. The incompletely developed genitalia of the male subimagos cannot be used as the basis for determination of species.

Specimens of the genus *Baetis* were taken at the following localities :—

K 65, between Gund and Sonamarg; May 18, 1932. Immature nymphs.

K 72, Matayan; May 20, 1932. Immature nymphs.

K 77, stream at Dras; May 21, 1932. One nymph.

K 86, Wakka Chu River, on clay-cliffs along river; two miles from Kargil. No date given. Male subimago.

Igu, Ladak; Sept. 1932. Male subimago, defective.

L 31, Lhabaps; June 23, 1932. Male subimago.

L 25, Leh; June 21, 1932. Female nymph.

L 34, Bao; June 25, 1932. Mature nymph.

L 46, Chagra; Aug. 5, 1932. Male subimago.

L 59, Kyam; July 20, 1932. Female imago.

L 72, Tokung; Aug. 8, 1932. Male subimago.

Genus *BÆTIELLA* Ueno.

Bætiella ladakæ, sp. n.

Male imago. Body 4-4½ mm.; wing 5½-6 mm. Head and thorax very dark red-brown; pleural sutures blackish. Turbinate eyes deep orange-brown, rather small, upper surfaces almost circular in outline. Legs deep yellow (detached from specimens, so that it is not possible to differentiate between second and third pairs). Base of femur shaded with red-brown; on some, brown shading also near apex (second or third leg). Claws and tarsal joinings brownish; distal joint of tarsus dusky, its apical margin blackish; brown markings at knee. Fore tarsus relatively short, about seven-eighths as long as the tibia and approximately equal to the femur in length. Second joint longest, third next in length, fourth shorter than third, distal joint subequal to third. On middle and hind legs femur almost as long as tibia; tarsus about two-thirds as long as tibia; tarsal joints in decreasing rank: 4, 1, 2, 3.

Wings hyaline; venation red-brown. Granulations in apical portion of costal and subcostal spaces. A small brown spot at extreme base of main longitudinal veins; on wing of one specimen a small brown spot at bulla, on subcosta. Cross-veins in disc of wing slightly thickened, heavier than longitudinals; those in first space behind subcosta appear very narrowly margined. Three or four

simple stigmatic cross-veins, slightly aslant. Paired marginal intercalaries, distinct in all interspaces back of the second, in middle area, none in first interspace, a single one in second interspace; none in anal area, none in last two cubital spaces.

Abdominal segments 2-5 semihyaline, yellowish. A faint dusky line along pleural fold and on posterior margins; intersegmental areas paler. Segments 6-10 opaque, rather bright red-brown. Tails yellowish, with a faint dusky tinge; beyond the middle shaded lightly with reddish brown. Joinings faintly dusky. Long joint of forceps strongly bowed in basal third; no penis-cover present. Genitalia as in fig. 10.

Holotype.—Male imago. Igu, Ladak; Sept. 1932. Yale North India Expedition. In private collection of the author.

Paratype.—Male imago; same data as holotype. In private collection of author.

It is difficult to separate imagos of the closely allied genera *Pseudoclaeon* and *Bætiella*. A single Palearctic species of *Pseudoclaeon* (10), represented by females only, has been reported. The genus *Bætiella* has hitherto been known only from the type-species (11), taken in Japan. The two male imagos from Igu, Ladak, are here placed in the genus *Bætiella* (1) because of the total absence of a penis-cover; (2) because of the known distribution of the species of the two genera, *Pseudoclaeon* being largely Indo-Australian, Nearctic, and Neotropical; and (3) because nymphs which correspond to those designated as *Bætiella* were collected by the Expedition in Kashmir.

The description of *Bætiella japonica* Ueno differs in certain important points from that of the two males from Igu, Ladak; hence the latter must be considered a new species. These differences are (1) the colour of the thorax and apical abdominal segments, and (2) the presence of a pair of intercalaries in the first two interspaces in the genotype.

A single male nymph from Kashmir, here described as *Bætiella* sp., resembles the nymph of *B. japonica* in the presence of a slender hair or spine on each claw near the tip, in the appearance of the labrum, and, like

that species, has but two tails. The first two characters separate it from nymphs of the genus *Pseudocloeon*, which are likewise two-tailed. There is no evidence that any specific relationship exists between this nymph and the males from Igu, Ladak. The absence of dark ventral markings would seem to preclude it from the species *B. japonica*.

Bætiella sp.

Male nymph. Body 5 mm.; tails $4\frac{1}{2}$ mm. Head dark red-brown; sutures yellowish. Thoracic notum red-brown, pronotum paler than mesonotum; median suture yellowish. Pleura yellowish except for a wide, semicircular, red-brown area above each leg. Sternum yellowish; a short, dark brown, transverse mark between the fore legs; other short dark marks near bases of all legs. Legs light red-brown. A deep brown "knee-spot" on femur and tibia; indistinct markings on upper surface of each femur, consisting of an incomplete median cross-band and a longitudinal stripe extending basad from this. Tibia paler than femur. Claw and apical half of tarsus darker red-brown; tibio-tarsal joining dark brown.

Abdominal tergites reddish brown, practically concolorous with pronotum. Anterior margin of each very narrowly blackish in median area; posterior margins slightly darker brown. Intersegmental areas yellowish. A pair of submedian, round, dark spots near middle area on tergites 7-10. On tergites 4-6 a pair of obscure, dark, submedian, triangular marks lie nearer the anterior margin. On tergites 1-3 these marks are almost obsolescent, but a small area at the median line on the posterior margin is darkened. Additional dorsal markings consist of a dark dash near the lateral margin of each tergite and a larger, obscure, dark blotch slightly nearer the centre of the anterior margin; these markings are most evident on the middle tergites. Venter very slightly paler than the dorsum; unmarked.

Gills greyish, each with a wide, brown, median stripe which does not quite attain the distal margin. Tracheæ completely obscured by this dark band. Gills obovate, slightly asymmetrical; a fringe of short hairs along the distal margin can be made out under moderately high

magnification. Tails two (a very short, conical rudiment of the middle tail is present also, as in *Pseudocloeon*). Pale reddish brown except at base, where each is somewhat yellowish; joinings obscurely darker.

Locality: K 57. Sind River, Kangan, Kaskmir; May 16, 1932. Alt. c. 5795 ft.

Genus *CLÆON* Leach.

Cloeon kashmiri, sp. n.

Male imago. Body $7\frac{1}{2}$ –8 mm.; wing 8 mm. Head pale reddish brown; indistinct dark mark at inner lower corner of eye; dark line between eyes. Turbinate eyes elongate-oval; orange. Antennæ light reddish brown; second joint narrowly dark-ringed at apex. Thorax reddish brown; posterior portion of prothorax brighter red-brown. Narrow dark line along antero-lateral margin of mesonotum; narrow pale median and submedian streaks; axillary cords greyish. Scutellum black-margined; depressed area on each side darker brown; scutellum dark brown, tip yellowish. Metanotum dark red-brown, outlined with black; narrow pale median line and short submedian streaks. Pleura paler than notum; a few dark brown areas below wing-bases and around legs. Median area of prosternum narrowly outlined with black.

Legs yellowish. Fore femur reddish brown, black-ringed at apex. Claws and all joinings darker. In fore leg femur about three-quarters the length of tibia; tarsus slightly longer than tibia. Second tarsal joint equal to third plus one-third of fourth; fifth shortest. Joints rank: 2, 3, 4, 5, 1. Tarsus of hind leg subequal to tibia, which is about three-quarters of femur. Basal tarsal joint almost as long as second, third, and fourth combined; about twice as long as second joint. Second joint not quite as long as third; fourth subequal to second. Wings hyaline, faintly yellow-tinged; in some lights appear very faintly milky. Stigmatic area faintly milky; 4 or 5 cross-veins, very faint, slightly aslant.

Abdominal segments 2–6 semihyaline, pale reddish brown; on some specimens distinctly yellowish; venter slightly paler. Indistinct, oblique, submedian streaks from anterior margin on tergites 2–6; small dark brown marks laterally on each, those on tergites 3 and 6

larger than others. A double black line outlines the tracheæ along pleural fold; small black mark at each stigma. Brownish submedian streaks extend the length of each sternite; a very small dark mark laterally on each near pleural fold. Segments 7-10 opaque, darker red-brown. Darker markings not evident on tergites; median streaks on sternites present but obscured. Intersegmental areas of abdomen distinctly paler. Genitalia reddish brown basally, yellowish distally (fig. 11). Tails very pale reddish brown in basal half, silvery white apically. Joinings reddish to purplish brown; alternate joinings wider; near apex joinings not darkened.

Female imago. Body 9 mm.; wing 9-9½ mm. Head, thorax, and abdomen flesh-coloured. Second joint of antenna black-ringed at apex. A short, dark, median, transverse mark near middle of pronotum; behind this a pair of submedian dark dots. A dark transverse streak near posterior margin, on each side of the pale median line. Depressions on each side of scutellum dark brown; a short dark mark on each side of anterior margin. Postero-lateral angles of metanotum outlined with dark brown; a dark dot on each side near anterior margin. Two short, dark, transverse marks on metanotum, near leg-base.

Legs yellowish to flesh-coloured. Fore femur faintly darker. Claws and two distal joints of tarsus brown. All joinings brown; a black dot at inner apical angle of trochanter; a short black streak on inner margin of tibia near base. Basal tarsal joint of third leg very slightly more than twice as long as second joint; second twice as long as third; fourth and second subequal. Tibia three-quarters of femur; tarsus slightly longer than tibia. Wings very faintly yellow-tinged. Costal and subcostal spaces largely obscured by a pale reddish-brown band. Areas around cross-veins pale; at bulla a wider pale space. Small pale marks also along costal margin, quite numerous in some specimens. Basal costal space almost wholly pale for half a millimetre beyond humeral vein; two faint brown marks in this area on costal margin. Extreme base of radius and lower portion of humeral cross-vein purplish brown. Longitudinal veins reddish brown; cross-vein in first three

spaces wholly pale, elsewhere these veins are brown, and slightly heavier than longitudinals in middle area of wing.

Small, dark, wedge-shaped lateral marks, one near each antero-lateral and postero-lateral angle, on abdominal tergites 2-7; traces of darker submedian streaks, as in male. Pleural tracheæ outlined as in male. Ventrally a dark brown lateral line on sternites 2-8, halfway between median line and pleural fold; this line does not quite reach the anterior or posterior margin of each sternite. A small dark mark in postero-lateral angle of sternites 2-6; on 7 and 8 this becomes a dark transverse line joining the longitudinal dark streak (less distinct on 8). Tails missing from all specimens. Tails of female subimago appear similar to those of male.

Holotype.—Male imago. K 38, windows of house-boat between Srinagar and Shadipur; April 12, 1932. Yale North India Expedition. In private collection of author.

Allotype.—Female imago: same data as holotype. In private collection of author.

Paratypes.—Three male imagos: same data as holotype. One male imago: windows of houseboat between Sumbal and Wular Lake, April 14, 1932. Three female imagos: K 37, windows of houseboat at Gagirbal, April 11, 1932; K 50, window of hotel in Srinagar, April 23, 1932; Srinagar, May, 1932. In private collection of author.

In type of genitalia this species resembles *C. tadjikistanicus* Brod. (12); however, it is considerably larger than that species and differs in abdominal coloration.

Claxon sp. A.

Male nymph. Body $5\frac{1}{2}$ -6 mm.; tails 4 mm. Head cream-coloured; two brown submedian streaks. Maxillary palp three-jointed; labial palp three-jointed. Thoracic notum mottled with brownish. Legs wholly pale. Abdominal tergites 2, 3, 5, and 6 largely red-brown; brownish median markings on tergite 1; 7-10 pale, narrowly darker on posterior margins; 8 and 9 with indistinct, median, transverse markings. No dark markings ventrally. Gills pale greyish, tracheæ black; gills double, shaped like a palm-leaf; tracheation palmate.

Locality: Aden; Feb. 21, 1932. Two mature nymphs.

Clæon sp. B.

Female nymph. Body 7-7½ mm.; tails broken. Head reddish brown; pale median stripe. Mouth-parts as in preceding species. Pronotum brown-mottled; no markings apparent on remainder of notum. Legs wholly pale. All abdominal tergites with median area of posterior margins darkened. A dark pyramidal spot occupies middle of tergite 1. Tergites 2, 5, and 6 with large, median, brown areas; pale, lateral, triangular areas; pale crescentic mark next to posterior margin. Tergite 3 similar, but dark median area much restricted. On tergites 7-9 a wide, dark, Y-shaped median stripe, head of Y near posterior margin. On 8 and 9 a curved brown band extends forward laterally from each arm of the Y. Tergite 10 wholly pale except for dark posterior margin. Venter unmarked. Gills as in preceding species, but tracheæ distinctly purplish black. Tails crossed by a dark band near apex.

Locality: K 34. Phashakuri, near Pampur; May 7, 1932. Four mature female nymphs. Alt. c. 5200 ft.

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III.—*Faune de Sarawak. Homoptères recueillis par l'expédition universitaire d'Oxford en 1932 et par Mr. Shelford autour de Kuching en 1900* *. Par V. LALLEMAND.

Superfamille **CICADOIDEA.**

Famille **Cercopidæ.**

Sous-famille *APHROPHORINÆ.*

Clovio sarawakana, sp. n.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 ♀ (type), 9. viii. 1932, in reed-bed; Claudetown, 1 ♀ (paratype), 25. vii. 1932, at light (*B. M. H. & A. W. M.*).

Vertex, pronotum, écusson, clypéus, pattes, partie interne des élytres ocre brun très clair; partie externe des élytres brun noir, avec trois taches claires au bord costal, la séparation des deux couleurs se fait le long du médian jusqu'à la partie apicale, dans cette région la coloration plus claire déborde un peu le médian vers l'extérieur; les trois taches sont disposées comme suit: la première jaune blanchâtre, allongée, en avant du milieu, les deux autres, blanchâtres, sur le tiers postérieur, la deuxième triangulaire est située peu en avant de la troisième qui est allongée; un gros point noir brillant se voit en arrière de la pointe du clavus; front et sternum bruns avec de chaque côté une bande pâle qui part du bord antérieur de la tête; segments abdominaux bruns bordés en arrière et sur les côtés d'ocre brun clair; organes génitaux ocre brun clair; épines des tibias et griffes des tarses brun noir. Sur le vertex se trouvent trois saillies mousses longitudinales et quatre sur le vertex et le pronotum; vertex long, un peu plus long que large; rostre court, s'étendant seulement jusque la base des hanches médianes; deux épines sur les tibias postérieurs.

Long. 10 mm.

* For an account of the chief collecting stations and for references describing the Oxford Expedition see C. Willemse, 1938, *Ann. & Mag. Nat. Hist.* ser. 11, vol. ii, p. 217. The names of collectors (*B. M. Hobby*, *A. W. Moore*, & *R. Shelford*) are indicated by initials. Except where otherwise stated the types are preserved in the British Museum (Natural History); the remaining material has been divided between the British, Oxford, and Sarawak Museums and the author.—*B. M. HOBBY.*

Perinoia exclamans Walk.

Mt. Dulit, Dulit trail, 1 specimen, 18. x. 1932, old secondary forest, undergrowth (B. M. H. & A. W. M.).

Dinda maura Dist.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 17. ix. 1932, old secondary forest, undergrowth (B. M. H. & A. W. M.); Kuching, 1 specimen, 16. iii. 1900 (R. S.).

Aphrophorias inclyta Walk.

Mt. Kalulong, Tehani River, 1 specimen, 8. xi. 1932, old secondary forest; foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 4. x. 1932, old secondary forest, recent clearing (B. M. H. & A. W. M.).

Clovia conifer Walk.

Kuching, 1 specimen, 22. ix. 1899 (R. S.).

Clovia expressa Walk.

Kuching, 1 specimen, 28. xii. 1900, 1 specimen, 1900 (R. S.).

Plinia ampla Walk. var. *nigrifrons* Schmidt.

Kuching, 8 specimens, 1900 (R. S.).

Plinia ineffecta Walk.

Mt. Dulit, Dulit trail, 1 specimen, 13. ix. 1932, primary forest (B. M. H. & A. W. M.); Kuching, 1 specimen, 5. viii. 1899 (R. S.).

Sous-famille *CERCOPINÆ*.

DULITANA, gen. nov.

Sur le front bombé, rappelant celui des *Monecphora*, une carène longitudinale médiane, un peu mousse à la partie supérieure et devenant de plus en plus aigue vers le bas, sur les côtés, des stries transversales au nombre d'une dizaine; rostre assez long, atteignant la base des hanches postérieures, ses deux articles sont égaux; bord antérieur de la tête en angle arrondi; sur le vertex une carène longitudinale séparant les ocelles qui sont très rapprochés, sa longueur est un peu plus grande

que la moitié de sa largeur entre les yeux ; pronotum densément et grossièrement ponctué ; trois fossettes sur l'écusson, une grande médiane et deux petites antérieures ; le médian et le cubitus se réunissent sur le quart basal des élytres et le radius se bifurque sur leur milieu, ils sont densément ponctués et leur longueur égale trois fois leur largeur, à leur partie apicale 4 à 5 grandes cellules et quelques nervures transversales entre le radius et le bord costal ; une forte épine sur les tibias postérieurs un peu en arrière de leur milieu.

Type du genre : *Dulitana obscura*, sp. n.

Dulitana obscura, sp. n.

Mt. Dulit, River Koyan, 2500 ft., 1 ♂ (type) and 7 (paratypes), 19. x. 1932, primary forest, sweeping ferns, riverside ; 1 (paratype), 16. x. 1932, 5 (paratypes), 15. xi. 1932 and 19. xi. 1932, primary forest, beaten from trees, riverside ; foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 (paratypes), 20. viii. 1932, 1 (paratype), 7. x. 1932, old secondary forest, mountain torrent on Dulit and side of stream ; River Kapah, tributary of River Tinjar (2 paratypes), 5. x. 1932 (*B. M. H. & A. W. M.*).

Brun noirâtre ; à la fin du deuxième tiers du bord externe des élytres, une tache plus claire surtout visible par transparence ; méso- et métasternum bruns, face supérieure recouverte d'une villosité dense et rousse.

Long. 5.5 à 6 mm.

Eoscarta semirosea Walk.

Kuching, 1 specimen, 4. v. 1900 (*R. S.*).

Keducarta semicincta, sp. n.

Mt. Dulit, 4000 ft., moss forest, 1 specimen, 27. x. 1932, light trap ; Mt. Dulit, River Koyan, 2500 ft., primary forest, 2 specimens, 19. x. 1932, light trap (*B. M. H. & A. W. M.*).

Vertex et partie supérieure du front : noirs ; un peu plus que la moitié inférieure du front, hanches, pattes, premier article du rostre : ocre jaune légèrement brun ou ocre brun clair ; pro- et mésosternum brun clair ; abdomen ocre brun clair ; pronotum, écusson : brun clair ; élytres rouge brunâtre à la base, devenant rouge

carmin foncé dans la partie postérieure ; ailes brunes à base ocre et nervures ocres en avant et noires en arrière ; second article du rostre, crochets des tarses et épines des tibias : noirs. Pronotum granuleux, densément et fortement ponctué en stries transversales ; sur le milieu de l'écusson une grande fossette peu profonde. Toute la surface supérieure de l'insecte est recouverte d'une villosité dense et rousse.

Longueur totale 10 mm. ; élytres, long. $3\frac{1}{2}$ mm., larg. $2\frac{2}{3}$ mm.

Keducarta roseinervis Schmidt, *borneensis*, subsp. n.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 5. vii. 1932 ; 4 specimens, 28. viii. 1932 ; 1 specimen, 1. ix. 1932 ; 1 specimen, 4. ix. 1932 ; 1 specimen, 14. ix. 1932, 2500 ft. ; 1 specimen, 17. ix. 1932, light trap, old secondary forest, beating undergrowth ; Mt. Dulit, Dulit trail, 1 specimen, 20. viii. 1932 ; 1 specimen, 3. ix. 1932, old secondary forest, undergrowth ; Mt. Kalulong, 2 specimens, 9 & 10. ix. 1932, old secondary forest ; Claudetown, 2 specimens, 25. vii. 1932, at light ; Tinjar to Rumah Bulang Ding, riverside, 1 specimen, 4-12. xi. 1932 ; River Kapah, tributary of River Tinjar, 1 specimen, 24. ix. 1932, primary forest ; Mt. Dulit, 4000 ft., moss forest, 1 specimen, 17. x. 1932, light trap (*B. M. H. & A. W. M.*).

Tête ou bien entièrement noire ou noir brun, ou bien ocre brun avec le vertex noir ; la couleur du thorax peut également varier du noir à l'ocre brun ; les pattes sont généralement ocre jaune, les dernières un peu plus foncées, cependant chez quelques exemplaires les antérieures et les médianes sont brun noirâtre et les dernières ocre brun ; le pronotum varie fortement de couleur, il est ou noir avec une large bande ocre ou ocre avec une bordure brun noir au bord antérieur ; élytres brun noir, quelquefois bruns, teintés de rouge à la partie postérieure, cette teinte est variable dans son intensité et son étendue ; les nervures, dans la partie apicale, sont généralement de couleur rougeâtre plus claire ; la bande et la tache du bord costal ont disparu, sauf chez un ou deux exemplaires où un certain rappel s'en maintient.

Long. 6 mm.

Mioscarta apicalis, sp. n.

Mt. Dulit, 4000 ft., moss forest, 1 ♂ (type) and 10 (paratypes), 27. x. 1932, light trap, 2 (paratypes), 19. x. 1932, 2 (paratypes), 21. x. 1932, sheet (light), 1 (paratype), 23. x. 1932, 2 (paratypes), 28. x. 1932, 2 (paratypes), 29. x. 1932, light trap, 1 (paratype), 25. ix. 1932; Mt. Dulit, River Koyan, 2500 ft., primary forest, 1 (paratype), 17. xi. 1932, primary forest, undergrowth; foot of Mt. Dulit, junction of rivers Tinjar and Lejok, 2 (paratypes), 29. viii. 1932, old secondary forest, light trap (*B. M. H. & A. W. M.*).

Tête, thorax, pattes ocre jaune; vertex, pronotum ocre jaune légèrement brunâtre; abdomen brunâtre; écusson, élytres brun foncé, sur ces derniers la partie médiane c. à d. la cellule formée par le cubitus et le médian, ainsi que l'espace compris entre le médian et le radius est d'un brun moins foncé et plus transparent; au bord externe en avant de la partie apicale, une tache triangulaire jaune brunâtre transparente. Sur le front une fossette partant du bord antérieur de la tête qui est arrondi; vertex un peu moins long que large; sur l'écusson une large fossette; une épine sur les tibias postérieurs.

Long. 6 mm.

Sialoscarta maculata, sp. n.

Borneo: Mowong (type) (*F. Muir*). Sarawak: Mt. Dulit, River Koyan, 2500 ft., primary forest, 3 (paratypes), 19. x. 1932, 2 (paratypes), 16. xi. 1932, 1 (paratype), 17. xi. 1932, undergrowth, 2 (paratypes), 18. xi. 1932, rotten wood, 1 (paratype), 20. xi. 1932, primary forest; foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 (paratype), 16. viii. 1932, primary forest, 1 (paratype), 2. xi. 1932, rainy and cold, 8–9 p.m., at light in house; Mt. Dulit, 4000 ft., moss forest, 1 (paratype), 4. viii. 1932, beating undergrowth, 1 (paratype), 25. x. 1932, light trap, 1 (paratype), 26. x. 1932, primary forest, light trap (*B. M. H. & A. W. M.*).

Type in author's collection, paratypes in British Museum (Nat. Hist.), London, and Hope Department, Oxford University Museum.

Elytres, écusson et tiers postérieur du pronotum ocre jaune légèrement brunâtre ; deux tiers antérieurs du pronotum, vertex, front et prosternum brun noir ; pattes, méso- et métasternum, ainsi que la partie médiane de l'abdomen ocre jaune, les côtés de ce dernier sont bruns ; ailes enfumées, brun noirâtre vers l'extrémité ; à la partie apicale des élytres une grande tache noire dont les limites sont les bords externe et apical ainsi que le médian ; la limite entre les deux couleurs du pronotum ne sont pas nettes, la coloration brun noir peut être réduite au tiers antérieur. Elytres trois fois aussi longs que larges ; sur l'écusson une large fossette ; sur la partie médiane du front une grande fossette longitudinale assez distante du bord antérieur de la tête ; une épine sur les tibias postérieurs.

Long. 6.5 mm.

Radioscarta surigaona Lall.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 17. x. 1932, old secondary forest, in undergrowth on leaves (*B. M. H. & A. W. M.*).

Trichoscarta solivaga Dist.

Kuching, 1 specimen, 19. ix. 1899, 1 specimen, 4. v. 1900 (*R. S.*).

Trichoscarta curvatiformis, sp. n.

Mt. Dulit, moss forest, 4000 ft., 1 specimen, 17. x. 1932 (*B. M. H. & A. W. M.*).

Tête, pronotum, écusson, sternum et cuisses : noir vert, brillants ; sur la partie supérieure du front, une tache allongée, orange ; ocelles jaune foncé ; abdomen, élytres brun noir, sur les derniers deux bandes longitudinales et deux transversales ; la première bande longitudinale, située le long du bord externe, plus large vers la base qu'elle n'atteint pas, se réduit à un mince filet et s'étend jusqu'à la première bande transversale ; la seconde, assez étroite, part de la base du clavus, longe le bord interne et dépasse légèrement le niveau de la base de l'écusson : la première bande transversale, plus étroite que la seconde, est fortement incurvée en avant, elle part du bord interne, au niveau de la pointe de l'écusson et aboutit au bord externe, à 3 mm. en arrière de la base ; la seconde part de la suture, près de la pointe du clavus et va en s'élargis-

sant jusqu'au bord externe; ailes brunes, à nervures noires et base rouge; tous les tibias et les tarses postérieurs: rouge carmin; premier article du rostre rouge teinté de brun; second article, tarses antérieurs et médians, extrémité et épines des tarses postérieurs: noirs; ocelles petits, situés un peu plus près l'un de l'autre que des yeux; sur la partie médiane du front des stries transversales peu profondes; pronotum lisse, très finement ponctué, à carène médiane atteignant le bord postérieur; 3 fossettes sur l'écusson, une grande médiane et deux petites antéro-latérales. Voisine de *T. curvata* Lall.

Longueur totale 12.5 mm.; élytres, long. 10 mm., larg. 3.5 mm.

Trichoscarta octonotata, sp. n.

Mt. Dulit, moss forest, 4000 ft., 1 specimen, 17. x. 1932; River Koyan, 2500 ft., 1 specimen, 19. x. 1932 (*B. M. H. & A. W. M.*).

Tête, pronotum, écusson: noir violet, brillants; sont jaunes: une bande longitudinale occupant la partie frontale du vertex et le sommet du front, ainsi que quatre taches sur le pronotum, dont deux médianes, transversales et deux plus ou moins triangulaires le long des bords latéro-antérieurs; élytres partagés en trois parties à peu près égales par deux bandes transversales, oranges: la première partie est noir brun, la seconde, noir brun à reflets violacés, la troisième brun clair, semitransparente; sur le premier tiers se trouve une bande longitudinale jaune, le long du bord interne et s'étendant jusqu'au niveau de la pointe de l'écusson; sternum et abdomen: brun noir, brillants; pattes et second article du rostre ocre brun clair; tibias et tarses postérieurs ocre jaune très légèrement brun; surface supérieure de l'insecte recouverte d'une villosité argentée assez épaisse. Pronotum à ponctuation assez dense et forte, à bord postérieur concave, sur sa surface une fine carène; rostre atteignant les hanches postérieures.

Longueur totale 13 mm.; élytres, long. 11 mm., larg. 4 mm.

Ectemnonotum bivittatum Lep. & Serv.

Mt. Dulit, 4000 ft., moss forest, 1 specimen, 18. x. 1932 (*B. M. H. & A. W. M.*).

Ectemnonotum acuminatum Schmidt.

Kuching, 7 specimens, 1899-1901 (R. S.).

Ectemnonotum atrum Lall.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 2. viii. 1932; 1 specimen, 7. ix. 1932, old secondary forest, under bark of felled timber (B. M. H. & A. W. M.).

Suracarta tricolor basinotata Butl.

Kuching, 11 specimens, 1899-1900 (R. S.).

Suracarta tricolor borneensis Schmidt.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 18. ix. 1932, old secondary forest (B. M. H. & A. W. M.).

ECTEMNOCARTA, gen. nov.

Ecartement des ocelles un peu plus grand que la distance qui les sépare des yeux. Pronotum à bords postérieur et latéro-postérieurs épais, le postérieur et l'antérieur sont droits, les latéro-postérieurs sont relevés et concaves en leur milieu; ses angles scapulaires sont saillants et arrondis; sa surface, très bombée est granuleuse, fortement et grossièrement ponctuée et montre une carène fort saillante, qui s'étend jusqu'au bord postérieur. Ecusson transversalement strié, creusé en fossette sur la partie antérieure et médiane, celle-ci est en grande partie recouverte par le pronotum. La forme du mésothorax rappelle celle des genres *Suracarta* et *Ectemnonotum* Schmidt, la protubérance est transversale, épaisse et dirigée en bas et en avant, séparée par une distance assez grande du bord postérieur, ce dernier est relevé, saillant et se compose de deux lobes aplatis d'avant en arrière, dont l'externe est plus large et plus élevé que l'interne. Une épine sur les tibias postérieurs. Sur les élytres, le médian et le cubitus ne sont pas soudés, mais réunis par un rameau transversal.

Ce genre est voisin d'*Opistharsostethus* Schmidt par la forme du pronotum, de l'écusson et des élytres, il s'en différencie par son mésothorax, qui le rapproche, à cet égard, des genres *Suracarta* et *Ectemnonotum* Schmidt.

Type du genre : *E. hobbyi*, sp. n.

Ectemnocarta hobbyi, sp. n.

Mt. Dulit, River Koyan, 2500 ft., primary forest, 1 specimen, 18. xi. 1932, rotten wood (*B. M. H. & A. W. M.*).

Pronotum rouge brique ; tête d'un rouge légèrement plus brunâtre ; écusson rouge brique vers la base, brun vers la pointe ; élytres brique sale, devenant ocre légèrement brunâtre à la partie réticulée, où ils sont transparents ; sur leur partie médiane une tache ovoïde, transversale, noire, débordant un peu le radius et le médian ; pattes rouge brique, tibias et tarses antérieurs ocre jaune ; cuisses postérieures noires sur les deux premiers tiers ; extrémité des épines et des crochets des tarses : noire ; méso- et métasternum noirs ; abdomen rouge brique brunâtre, son premier segment, à la face inférieure, est largement noir rougeâtre, dans la partie médiane.

Longueur totale 22 mm. ; élytres, long. 17 mm., larg. 5 mm.

Je le dédie à un des membres de l'expédition, Dr. B. M. Hobby.

Opistarsostethus menaca Dist.

Kuching, 2 specimens, 1900 (*R. S.*).

Opistarsostethus simulans Schmidt.

Mt. Kalulong, 5000 ft., 1 specimen, 5. xi. 1932, primary forest (*B. M. H. & A. W. M.*).

Opistarsostethus nervosus, sp. n.

Mt. Dulit, 4000 ft., moss forest, 1 specimen, 14. x. 1932 (*B. M. H. & A. W. M.*).

Tête, pronotum, écusson : ocre brun clair ; sur les côtés du clypéus des taches brun noir ; joues et antéclypéus : brun noir ; premier article du rostre ocre brun, le second est brun noirâtre ; 2/3 antérieurs des élytres brun clair, avec une bordure externe plus pâle, d'un ocre légèrement brun, de fines bandes ocre jaune sur chaque secteur et une tache brun noir entre le médian et le radius, en arrière de la naissance de la branche oblique qui réunit le médian et le cubitus ; 1/3 postérieur ocre brunâtre clair ; sternum noir brillant ; sont ocre légèrement rougeâtre : le long des bords externes du

prosternum, une band qui s'élargit fortement vers l'arrière, les pattes antérieures, l'extrémité inférieure des cuisses, les tibias et tarses des pattes médianes et postérieures, une bordure postérieure des premiers segments abdominaux, les deux derniers segments ainsi que les organes génitaux; cuisses médianes et postérieures, premiers segments abdominaux, extrémité des épines des tibias postérieurs: noirs. Ecartement des ocelles un peu plus grand que la distance qui les sépare des yeux; sur le pronotum densément ponctué, une carène médiane, s'étendant sur les $\frac{3}{4}$ de sa longueur; angles scapulaires saillants, non aigus; mésosternum bombé, sans protubérance, à bord postérieur lamelliforme fort saillant; rostre court ne s'étendant que jusqu'en avant du bord postérieur du mésosternum; écusson grossièrement strié en travers, ayant une grande fossette sur la moitié antérieure, une partie de cell-ci est recouverte par le pronotum; deux épines sur les tibias postérieurs, une petite tout près de la base et une grande au commencement du tiers apical.

Longueur 21 mm.; élytres, long. 17 mm., larg. 6 mm.; largeur du pronotum 10 mm.

Leptataspis borneensis Schmidt.

Mt. Dulit, River Koyan, 2500 ft., primary forest, 1 specimen, 15. xi. 1932, river bank vegetation (*B. M. H. & A. W. M.*).

Leptataspis cassandra Bredd.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 26. viii. 1932, light trap (*B. M. H. & A. W. M.*).

Leptataspis kiauensis Lall.

Kuching, 1 specimen, 14. viii. 1899 (*R. S.*).

Superfamille **FULGOROIDEA.**

Famille **Laternariidae.**

Penthicodes farinosa Weber.

Kuching, 18 specimens, 1899-1900 (*R. S.*).

Scamandra kuchingana, sp. n.

Kuching, 1 ♂ (type), 1 ♂ and 4 ♀♀ (paratypes), Dec. 1900 to Feb. 1901 (*R. S.*).

♀.—Face et clypéus bruns au milieu, rougeâtres sur les côtés ; vertex, pronotum, écusson, élytres, ocre rouge sale ; les derniers sur leurs deux tiers antérieurs sont parsemés de taches plus clairs, les nervures dans la partie apicale sont très clairs, tranchant sur le fond ; sternum, pattes brun foncé ; rostre brun ; abdomen brun clair ; organes génitaux noirs ; ailes, dans la partie externe ocre rouge sale, avec quelques taches brunes peu marquées et devenant plus brunes dans la région apicale ; dans la partie anale, elles sont d'un gris rougeâtre très légèrement teinté de brun et deviennent plus claires vers l'extrémité ; sur leur surface, sauf dans la région apicale externe, se voient d'assez nombreuses nervures transversales d'un blanc sale. Processus céphalique ne s'étendant que sur la moitié antérieure du vertex ; le rostre atteint le milieu de l'abdomen ; sur les tibias postérieurs trois épines, leur tubercule basal est saillant.

Longueur du corps 16 mm. ; élytres. long. 21 mm., larg. 9 mm.

♂.—Vertex, pronotum, écusson, élytres brun clair ; les derniers sont plus clairs et plus bruns par place ; la cellule costale est rouge ; les ailes sont à peu près de même coloration que celles des ♀, mais le champ anal est plus clair, d'un blanc grisâtre ; les pattes sont brunes, les antérieures un peu plus foncées.

Longueur du corps 13 mm. ; élytres, long. 17.5 mm., larg. 7 mm.

Scamandra moorei, sp. n.

River Kapah, tributary of River Tinjar, 1 ♀ (type), 4. x. 1932, primary forest, clearing (B. M. H. & A. W. M.).

Tête, pronotum, écusson brun rougeâtre clair ; sauf sur la ligne médiane et derrière les yeux, de petits points noirs espacés se voient sur la surface du pronotum ; sternum et face supérieure de l'abdomen rougeâtres ; face inférieure du dernier et organes génitaux gris brunâtre légèrement teinté de rouge ; tibias et tarses brun noirâtre ; cuisses brun rougeâtre ; rostre brun ; élytres à base rouge, sur un peu plus de la moitié antérieure ils sont brun foncé et vus par transparence rougeâtres ; la partie postérieure est bistre (brun clair), séparée de l'antérieure par une bande ocre clair ; l'extrémité est d'un brun plus foncé ; à leur face inférieure,

une bande blanche parallèle au bord postérieur; la moitié antérieure de la partie externe des ailes est brune avec des taches et des bandes rouges, sa moitié postérieure est brun clair ou orange rougeâtre très légèrement brun, suivant l'angle sous lequel on la regarde; au devant du bord postérieur une bande blanche qui lui est parallèle; la partie anale, ocre à la base, est rouge carmin bordée de blanc, cependant vers l'avant, elle est légèrement teintée de brun; sur les ailes les nervures sont blanches par places. Le processus céphalique ne s'étend que sur la moitié antérieure du vertex; le rostre atteint le milieu du ventre; sur les tibias postérieurs trois épines, leur tubercule basal est peu aigu.

Longueur totale 38 mm.; longueur du corps 27 mm.; élytres, long. 33 mm., larg. 14 mm.

Je dédie cette espèce à un des membres de l'expédition, Mr. A. W. Moore.

Pyrops nobilis Westw.

Mt. Kalulong, 400-650 ft., 1 specimen, 1. xi. 1932, old secondary forest; foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 22. ix. 1932 (B. M. H. & A. W. M.).

Prolepta dulitana, sp. n.

Mt. Dulit, 4000 ft., moss forest, ♀ (type) and ♀ (paratype), 16. x. 1932 (B. M. H. & A. W. M.).

Tête brun noir rougeâtre, les bords, la carène médiane longitudinale et les transversales, les bords du front et du clypéus, une ligne médiane longitudinale sur ce dernier sont rouge brique; processus céphalique rouge entre les carènes qui sont brun noir sur les faces supérieures et latérales; la face inférieure est rouge irrégulièrement teintée de brun; pronotum et écusson rouge brique avec des taches noires, plus petites sur le premier, et beaucoup plus grandes sur le second; abdomen noir avec des taches ocre brun; sternum et pattes rouge brique avec des taches noires plus ou moins grandes; le premier article du rostre est rouge brique et le second brun rougeâtre; élytres ocre brun, tachés et ponctués de brun noir; le radius, le médian, l'axillaire interne, les nervures transversales spécialement vers le milieu de l'élytre sont rougeâtres, tandis que le cubitus et

l'axillaire externe, la suture clavo-coriale sont vert foncé vers la base, puis petit à petit deviennent rougeâtres; la région voisine de la suture est plus claire; la moitié apicale est transparente, hyaline, à nervures rouges et à taches brun noir, la première de celles-ci et la plus grande se trouve entre la branche interne du médian et l'externe du cubitus, de celle-ci en part une série d'autres formant bande et s'étendant jusqu'au bord postérieur, quelques unes se trouvent près du bord postérieur (7 à 8), et d'autres près du bord costal (5 à 6). Ailes blanches hyalines, à bords et à nervures brun noir sauf sur le champ anal, où elles sont un blanc très légèrement verdâtre. Processus céphalique brusquement redressé vers le haut; rostre s'étendant jusqu'au devant des organes génitaux; 6 épines sur les tibias postérieurs.

Longueur du corps (sans le processus) 18 mm.; longueur du processus 4 mm.: élytres, long. 20 mm., larg. 6 mm.

Hotinus intricata Walk.

Mt. Kalulong, L. Miwal, 7 specimens, 2. xi. 1932; Tinjar to Rumah Bulan Ding, riverside, 4 specimens, 4. xi. 1932; River Kapah, tributary of River Tinjar, 2 specimens, 22. ix. 1932; Mt. Dulit, 4000 ft., moss forest, 14. x. 1932 (*B. M. H. & A. W. M.*).

Hotinus gigantea Butl.

Long Lobang, 1 specimen, 28. x. 1932, Jalutong plantation, on wet undergrowth (*B. M. H. & A. W. M.*).

Hotinus hobbyi, sp. n.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 ♀ (type), 23. viii. 1932, primary forest, undergrowth, (*B. M. H. & A. W. M.*).

Tête, pronotum, écusson, sternum ocre brun clair légèrement ferrugineux; sur le vertex trois bandes longitudinales noires, une médiane et deux latérales qui se réunissent pour couvrir la face supérieure du processus céphalique; sur le pronotum et l'écusson une bande longitudinale médiane noire, en outre sur le second une tache noire près de chaque bord latéral;

de chaque côté du prosternum une bande noire allant de l'œil à la cuisse antérieure; antennes, pattes antérieures, tibias et tarses médians noirs; cuisses médianes noires et ocre ferrugineux; pattes postérieures ocre ferrugineux avec l'extrémité des épines et des tarses brun noirâtre; rostre brun noirâtre; élytres verts, plus foncés à la base, sur leur moitié antérieure, deux bandes transversales ainsi qu'une tache au bord costal blanc jaunâtre; sur la moitié postérieure huit taches jaune orange, les nervures y deviennent jaune verdâtre, puis jaunes. Rostre s'étendant jusqu'à la base des cuisses postérieures; six épines sur les tibias postérieurs.

Cette espèce fait partie du groupe *Candelaria* Linn.

Longueur totale 40 mm.; élytres, long. 30 mm., larg. 11 mm.

Je le dédie à un des membres de l'expédition, Dr. B. M. Hobby.

Famille **Fulgoridæ.**

Sous-famille *FULGORINÆ.*

Dichoptera strigivitta Walk.

Kuching, 3 specimens, 1899-1900 (*R. S.*).

Centromeria speilinea Walk.

Kuching, 10 specimens, 1899-1900 (*R. S.*).

Centromeria longipennis Walk.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 23. viii. 1932, light traps; 1 specimen, 30. ix. 1932, fish trap (*B. M. H. & A. W. M.*).

Miasa smaragdilinea Walk.

Kuching, 11 specimens, 1899-1900 (*R. S.*); River Kapah, tributary of River Tinjar, 5 specimens, 5-9. x. 1932, undergrowth and on leaves; foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 5. x. 1932, light trap, 1 specimen, 2. ix. 1932, 8-9.30 p.m., rainy and cold, at light in house (*B. M. H. & A. W. M.*).

Fulgora (Dictyophora) pallida Don.

Kuching, 2 specimens, 1899-1900 (*R. S.*); foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 26. viii. and 4. x. 1932, cultivated land now waste

and old secondary forest; River Kapah, tributary of River Tinjar, 1 specimen, 5. x. 1932, on leaves (*B. M. H. & A. W. M.*).

Tropidophora (Dictyophora) javana Leth.

Kuching, 2 specimens, 1899–1900 (*R. S.*).

Famille Tropiduchidæ.

Sous-famille *TROPIDUCHINÆ*.

Varma fervens Walk.

Kuching, 8 specimens, 1899–1900 (*R. S.*); foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 22. ix. and 16. xi. 1932, old secondary forest (*B. M. H. & A. W. M.*).

Famille Lophopidæ.

Sous-famille *LOPHOPINÆ*

Serida latens Walk.

Kuching, 1 specimen, 10. viii. 1899 (*R. S.*).

Aluma ocellata Dist.

Kuching, 5 specimens, 1899–1900 (*R. S.*).

Famille Eurybrachidæ.

Sous-famille *EURYBRACHIDINÆ*.

Frutis pulchra Gray.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 17. viii. 1932, primary forest, on tree-trunk; Mt. Dulit, River Koyan, 2500 ft., primary forest, 1 specimen, 16. xi. 1932, beating (*B. M. H. & A. W. M.*).

Thessitus insignis Westw.

Sarawak: data missing, 1 specimen (*B. M. H. & A. W. M.*).

Famille Flatidæ.

Sous-famille *FLATINÆ*.

Phromnia hilaris Gerst.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 2. ix. 1932, at light (*B. M. H. & A. W. M.*).

Cerynia albata Stål.

Kuching, 1 specimen, 1899 (*R. S.*).

Bythopsyrrna copulanda Dist.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 8. x. 1932, light trap (*B. M. H. & A. W. M.*).

Bythopsyrrna circulata Guér.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 31. viii. 1932, light trap (*B. M. H. & A. W. M.*).

Bythopsyrrna tineoides Oliv.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 4 specimens, 19. viii. 1932, cultivated land now waste (*B. M. H. & A. W. M.*); Kuching, 25 specimens, 1899–1900 (*R. S.*).

Colobesthes semanga Dist.

Kuching, 1 specimen, 23. vii. 1900 (*R. S.*).

Lawana guttifascia Walk.

Kuching, 1 specimen, 16. vii. 1900 (*R. S.*).

Kayania volens Walk.

Kuching, 9 specimens, 1899–1900 (*R. S.*); Mt. Dulit, River Koyan, 1 specimen, 2500 ft., primary forest, 18. xi. 1932 (*B. M. H. & A. W. M.*).

Phyllyphanta producta Sign.

Kuching, 1 specimen, 25. xi. 1900 (*R. S.*); foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 1. ix. 1932, light trap (*B. M. H. & A. W. M.*).

Salurnis dultana, sp. n.

Mt. Dulit, River Koyan, 2500 ft., primary forest, 1 (type) and 1 (paratype), 16. xi. 1932, sweeping ferns and on bark of felled trees; foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 (paratype), 2. viii. 1932 (*B. M. H. & A. W. M.*).

De coloration à peu près pareille à celle de *S. marginella* Guér., elle est verte; sur le milieu du vertex, du pronotum et de l'écusson, une bande brun rougeâtre; les bords

des élytres ainsi que la nervure anale sont rouges, au bord est accolée une bordure de taches brunes ; le milieu des cellules est plus clair d'un blanc vert ; à l'extrémité du clavus une tache arrondie noire ; face inférieure du corps d'un vert plus pâle ; tibias antérieurs et médians dans leur partie externe ainsi que tous les tarses, d'un brun rougeâtre très clair.

Longueur 12.5 à 13 mm.

Se distingue de *S. marginella* Guér. par le bord costal des élytres moins arrondi, par le nombre des carènes du pronotum (3 au lieu de 4) et l'angle sutural moins aigu ; de *S. granulosa* Stål, par le bord costal non brisé en angle obtus.

Salurnis dulitana minuta, f. nov.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 (type) and 2 (paratypes), 26. ix. 1932, light traps (B. M. H. & A. W. M.).

Au pied du Mt. Dulit se trouve une forme locale se différenciant par la coloration des élytres dont le centre des cellules n'est pas blanc verdâtre ; les nervures transversales sont un peu moins nombreuses ; la carène médiane de l'écusson s'étend sur toute sa longueur.

Longueur 10.5 mm.

Cryptoflata guttularis Walk.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 4 specimens, 29. viii.–5. ix. 1932 ; Mt. Dulit, River Koyan, 2500 ft., 1 specimen, 19. x. 1932, primary forest (B. M. H. & A. W. M.) ; Kuching, 1 specimen, 19. vii. 1899 (R. S.).

Flatoptera depressa Mel.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 29. vii. 1932, old secondary forest, light trap (B. M. H. & A. W. M.).

Flatoptera minuta Schmidt major, f. nov.

Mt. Dulit, 4000 ft., moss forest, 1 specimen, 19. x. 1932 ; foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 4. x. 1932, light trap (B. M. H. & A. W. M.).

Longueur totale 10 mm. ; élytres, long. 15 mm., larg. 7 mm.

PARAFLATOPTERA, gen. nov.

Vertex court, au moins trois fois aussi large que long ; front légèrement plus long que large, à sa partie supérieure une trace de carène ; pas de carène médiane sur le pronotum. Sur la moitié antérieure du corium pas de nervures transversales sauf sur la membrane costale ; sur le clavus, 3 à 4 nervures entre la suture et la première axillaire, entre les deux axillaires elles sont plus nombreuses ; une seule ligne de nervures transversales apicales ; vers la base, la membrane costale est plus large que la cellule costale, mais elle se retrécit en arrière et devient plus étroite que la cellule ; le cubitus et le médian se bifurquent vers la fin du tiers antérieur, le radius non loin de la base, sur le quart antérieur ; des granules sur le clavus et à la partie apicale ; une épine sur les tibias postérieurs.

Se distingue de *Flatoptera* Mel. par l'absence de nervures transversales dans la cellule costale et par le nombre relativement restreint de celles-ci sur tout l'élytre, ainsi que par l'absence de carène sur le pronotum ; se différencie d'*Idume* Stål par la présence de nervures transversales sur le clavus et l'absence de la seconde ligne de nervures apicales.

Type du genre : *Paraflatoptera transversa*, sp. n.

Paraflatoptera transversa, sp. n.

Mt. Dulit, 4000 ft., moss forest, 1 specimen, 28. x. 1932, light trap (B. M. H. & A. W. M.).

Vertex, pronotum, écusson, deux bandes transversales sur les élytres, une post-médiane et une apicale : brun clair. Élytres vert pâle, la partie du clavus, interne à la première axillaire, est légèrement brune ; la première bande s'élargit après la branche interne du médian et pâlit sur le clavus, de même sur la bande apicale plusieurs nervures et quelques granules sont légèrement plus clairs. Face inférieure du corps ocre jaune un peu brunâtre.

Longueur totale 6 mm. ; élytres, long. 8 mm., larg. 4-5 mm.

Nephesa rectilinea Walk.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 1. x. 1932, light trap (B. M. H. & A. W. M.).

Nephesa rorida Walk.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 28. viii. and 2. ix. 1932, light trap, old secondary forest (*B. M. H. & A. W. M.*).

Nephesa grata Walk.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 6. ix. 1932, light trap (*B. M. H. & A. W. M.*).

Idume plicata Mel.

Kuching, 7 specimens, 1899–1900 (*R. S.*); Mt. Dulit, 4000 ft., moss forest, 17 specimens, 17–28. x. 1932, light trap (*B. M. H. & A. W. M.*).

Seliza vidua Stål.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 26. ix. and 3. x. 1932, light trap (*B. M. H. & A. W. M.*).

Seliza variata Mel.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 8. x. 1932, light trap (*B. M. H. & A. W. M.*).

Uxantis reversa Mel.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 1. ix. and 4. x. 1932, light trap (*B. M. H. & A. W. M.*).

Atracis surrecta Walk.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 2–4. ix. 1932, light trap (*B. M. H. & A. W. M.*).

Atracis surrecta Walk. var. *a* Dist.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 8 specimens, 1–3. ix. to 7–9. x. 1932, light trap (*B. M. H. & A. W. M.*).

Atracis scripta Mel.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, light trap, 3 specimens, 26. viii. and 3. x. 1932 (*B. M. H. & A. W. M.*).

Atracis inæqualis Walk.

Mt. Dulit, 4000 ft., moss forest, 1 specimen, 2. x. 1932 ; foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 26. ix. 1932, light trap (*B. M. H. & A. W. M.*).

Atracis variegata, sp. n.

Mt. Dulit, 4000 ft., moss forest, 3 specimens, 21–27. x. 1932, light trap (*B. M. H. & A. W. M.*).

Ocre jaune pâle ou gris jaunâtre, taché ou ponctué de brun sur toute la surface supérieure ; sur le pronotum une grande tache médiane et deux petites, latérales, situées chacune près des bords latéro-postérieurs ; sur les élytres trois grandes taches brunes, mal limitées, variables d'un exemplaire à l'autre comme dimensions : la première voisine de la base est plus ou moins coupée en deux par une fine bande transversale claire partant de la base du clavus, qui est ocre jaune pâle ; la deuxième, triangulaire, longe le bord externe dans sa moitié postérieure ; la troisième, longitudinale, se voit en arrière de la seconde, partant de près de la suture et s'étendant jusque près du bord apical. Ailes blanches à nervures ocre brun clair.

Sur la moitié antérieure du front une légère carène médiane ; vertex plus long que large ; rostre s'étendant jusqu'entre les hanches médianes ; sur les élytres, une saillie au niveau de la bifurcation du radius, membrane costale plus de deux fois aussi large que la cellule costale, une ligne de nervures subapicales, les cellules apicales sont au moins trois fois aussi longues que larges ; une épine sur les tibias postérieurs.

Longueur totale 16 mm. ; élytres, long. 14 mm., larg. 5 mm.

Atracis maculipennis, sp. n.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 7. x. 1932, light trap (*B. M. H. & A. W. M.*).

Ocre jaune brunâtre très clair, légèrement maculée de brun sur la face supérieure ; sur les élytres une grande tache noire voisine de la base (elle ne la touche qu'au niveau de la suture), s'étendant du bord externe à la première axillaire, en son milieu, entre les troncs du radius et du cubitus une collection de granules ocre jaune. Front aplati, sans carène ; élytres tectiformes, à bord

externe ondulé et présentant quatre saillies arrondies ; la membrane costale très large à la base se rétrécit en arrière, la plupart de ses nervures transversales sont simples, quelques unes seulement sont bifurquées ; les trois secteurs partent de la cellule basale, séparés à leur base ; une seule ligne de nervures subapicales ; une épine sur les tibias postérieurs.

Longueur totale 13 mm. ; élytres, long. 11 mm., larg. 4 mm.

Famille Ricaniidæ.

Sous-famille RICANINÆ.

Pochazia convergens Walk.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 4-6. ix. 1932, old secondary forest, light trap ; Mt. Dulit, River Koyan, 2500 ft., 2 specimens, 17. xi. 1932, primary forest, beating (*B. M. H. & A. W. M.*) ; Kuching, 1 specimen, 23. vii. 1900 (*R. S.*).

Pochazia fuscata Fabr.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 6 specimens, 1. ix.-4. x. 1932, light trap (*B. M. H. & A. W. M.*) ; Kuching, 2 specimens, 1899-1900 (*R. S.*).

Pochazia sinuata Stål.

Kuching, 8 specimens, 1899-1900 (*R. S.*).

Pochazia sinuata Stål var. *quadrinotata* Mel.

Kuching, 1 specimen, 12. xii. 1899 (*R. S.*).

Pochazia sinuata Stål var. *binotata* Schmidt.

Kuching, 4 specimens, 1899 (*R. S.*).

Pochazia sinuata Stål var. *unicolor* Mel.

Kuching, 8 specimens, 1899-1900 (*R. S.*).

Pochazia subflava Dist.

Long Lobang, 1 specimen, 28. x. 1932, Jalutong plantation, on wet undergrowth (*B. M. H. & A. W. M.*).

Ricania speculum Walk.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 3 specimens, 26. viii.-25. ix. 1932, old secondary forest,

light trap; River Kapah, tributary of River Tinjar, 1 specimen, 9. x. 1932, clearing (*B. M. H. & A. W. M.*); Kuching, 3 specimens, 1899–1900 (*R. S.*).

Ricania stupida Walk.

Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 2 specimens, 22. ix. 1932, old secondary forest; Mt. Dulit, Dulit trail, 1 specimen, 6. x. 1932, primary forest (*B. M. H. & A. W. M.*); Kuching, 9 specimens, 1899–1900 (*R. S.*).

Ricanula signata Stål.

Kuching, 7 specimens, 1899–1900 (*R. S.*).

Ricanoptera mellerborgi Stål.

Kuching, 10 specimens, 1899–1900 (*R. S.*); foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, 1 specimen, 4. viii. 1932; River Kapah, tributary of River Tinjar, 1 specimen, 6. x. 1932 (*B. M. H. & A. W. M.*).

Sous-famille *NOGODINÆ*.

Mindura confusa Dist.

Kuching, 4 specimens, 1899–1900 (*R. S.*).

Sassula osmyloides Walk.

Mt. Dulit, Dulit trail, 2 specimens, 16. viii. 1932, primary forest (*B. M. H. & A. W. M.*).

Varcia nigrovittata Stål.

Kuching, 16. xii. 1899 (*R. S.*).

Sassula sorurcula Stål.

Kuching, 5 specimens, 1899–1900 (*R. S.*).

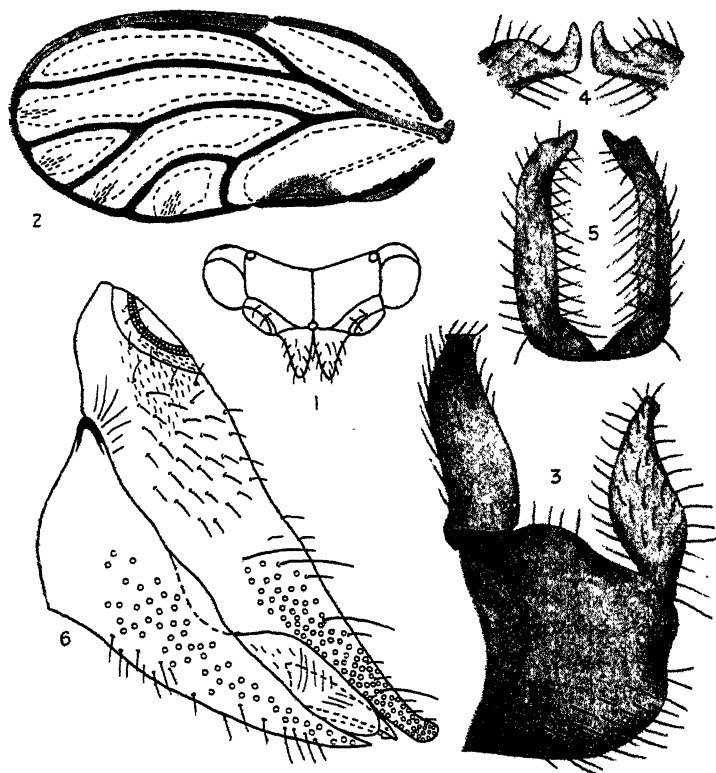
IV.—*Description of a new Psyllid from Greenland*
(Homoptera). By K. ŠULC.

Psylla septentrionalis, sp. n.

Kopf:—*Stirnkegel* allmählich ausgezogen, mit stumpf abgerundeter Spitze, etwas kürzer als die Mittellinie des Scheitels (6 : 7).—*Fühler* 1 mm. lang, fadenförmig.—*Farbung*: Grundfarbe schwarz, bräunlich, die Umgebung

der Ocellen, der Vorderrand des Scheitels und die Stirnkegelspitzen gelblich.—Behaarung der Stirnkegel dicht und grauweiss.

Thorax: Grundfarbe gelb, orangegelb mit brauner oder schwarzer Zeichnung die sich manchmal so verbreitet, dass sie die Grundfärbung fast vollständig verdeckt.



1, Kopf, von oben; 2, Vorderflügel; 3, ♂ Genitalsegment Kopulationszange und Analsegment, von der Seite; 4, Ende der Kopulationszange, von oben; 5, Kopulationszange, von hinten; 6, ♀ Anal- und Genitalsegment, von der Seite.

Vorderflügel 2.45 mm. lang; 1.05 mm. ist die grösste Breite, das Flügelende breit abgerundet, der Flügelgipfel liegt fast in der Mitte des *margo cell. Rs.*—*Adern*: *C+Sc* ziemlich stark gebogen, *R* 1 endigt noch vor dem Ende

des Stigmas, *Rs* leicht wellig, *R* länger als *M + Cu*, *M* leicht gebogen, endigt über dem Anfang des äusseren Drittels von *Cu* 1.—Färbung der Adern: Grund hellbraun, die Rippen schwarz, Stigma, *C + Sc*, *R + M + Cu* und proximale Teile von *R* und *M + Cu* heller.—*Flügelmembran*: wasserhell, ungefärbt, nur bei einem Weibchen war *Cu* 2 beiderseits mit einem schmalen bräunlichen Streifen versehen und die Klavusecke leicht geschwärzt.—Die Verbreitung der *Membrandornen* siehe auf der Abbildung.

Hinterflügel mit braunen Adern.

Beine: bräunlich, gelbbraunlich mit geschwärzten Oberschenkeln.

Abdomen: Sternite und Tergite tuschschwarz, die Verbindungsmembranen hell gelblich.

♂ *Körperende*.—*Genitalsegment* 0·40 mm. lang und 0·37 mm. hoch, nach hinten und unten bogenförmig abgegrenzt, bis tiefschwarz, hinten unten weissgrau behaart.—*Kopulationszange von der Seite* 0·30 mm. hoch, unten schmaler, in der Mitte der Höhe am breitesten (0·11 mm.), dann wieder sich zur abgerundeten Spitze allmählich verschmälernd und leicht nach hinten gebogen; hinten, unter der Spitze sehen wir ein kleines Dreieck, das schon dem Endhacken angehört.—*Von oben* gesehen, endigt die ziemlich breite Zange plötzlich mit einem starken kackenförmigen Zahne; seine hintere Ecke ist abgerundet, die Innenseite leicht ausgebogen, die Spitze stumpf abgerundet und leicht nach aussen gebogen, zwischen seiner äusseren Seite und der, vorne breit abgerundeten breiten Partie der Zange, ist ein tiefer fast halbkreisförmiger Ausschnitt.—*Von hinten* gesehen sind die Zangenäste oben und unten nach innen gebogen, der längste Mittelteil ist fast gerade; der innere Umriss der geschlossen Zange ist ein, oben und unten scharfes, in der Mitte etwas eingebogenes 0; das Ende des Zangenastes ist oben ausgeschweift und endigt mit einem, an der Spitze stumpf abgerundeten Kegel.—*Sienabraune Färbung*, ziemlich starke Behaarung.—*Analsegment* 0·33 mm. hoch, 0·13 mm. breit, gerade, das Ende leicht nach hinten gebogen, am hinteren Umriss nicht verbreitet, schwarz, grauweisslich behaart.

♀ *Körperende*.—*Analsegment* 0·5 mm. lang, von oben länglich keilförmig, von der Seite ist sein oberer Umriss

leicht wellenförmig, die proximalen zwei Drittel gleichmässig breit, das distale Drittel schmal, hinten an der Spitze von unten nach oben abgerundet; die proximale Hälfte der Fläche dicht, kurz behaart, unter dem Analring mit feinen kurzen Chitinnadeln bedeckt, der schmale Endteil mit cca. 12μ langen spitzigen Dornen dicht besetzt, die sich noch eine Strecke in Keilformation auf dem breiteren proximalen Anteil hinziehen; die ziemlich spärlichen Haare sitzen hier unter dem oberen Umrisse, die Mehrzahl von ihnen ist kurz, jedoch 4 von ihnen sind jederseits sehr lang.—*Analring* und *Anus* wie gewöhnlich.—*Genitalsegment* von der Seite gesehen 0.4μ lang, keilförmig, sein Endteil ist leicht nach oben gebogen; gleichgeformte Dornen bedecken fast die ganzen hinteren zwei Drittel der Fläche, aber erreichen weder den oberen Rand noch den unteren Umriss; kürzere und längere grauweissliche Haare (bis 72μ) bedecken die Fläche zwischen der Dornenfläche und dem unteren Umrisse.—*Legescheiden* sind hinten abgerundet und erreichen kaum die Spitze des Genitalsegmentes;—äusserer Legestachel ist am Ende abgerundet und unter dem Ende seicht, unbeträchtlich eingeschnitten (d.h. mit einem Zähnnchen).—Innerer Legestachel kurz, dreieckbeilförmig, das Ende leicht spitzig.

Körperlänge: ♂ 2 mm., ♀ 2.25 mm.

Nährpflanze: unbekannt.

Larven: unbekannt.

Material: in 6 Stücken vorhanden: 1 Männchen, 5 Weibchen; dieselben waren alle in einem Glässchen beisammen.

Geographische Verbreitung: Oxford University Greenland Expedition, 1936, Sondre Stromfjord, lat. 67° , Camp Lloyd, head of Fjord (*H. G. Vevers*), 11. viii. 36, und Amerdlog Fjord, lat. 67° , Utorkait (*H. G. Vevers*), 2. vii. 36.

Type dieser Art ist das beschriebene Männchen denn die, im gleichen Glässchen vorliegenden Weibchen könnten unter Umständen einer anderen, nahe stehenden Art angehören.

Bemerkung. Bisher nicht beschrieben, ihre Verwandtschaft zu den bis jetzt bekannten Arten ist nicht leicht festzustellen.

V.—*The Upper Valentian Gastropod Fauna of Shropshire.*
By B. L. PITCHER, Ph.D., D.I.C., A.R.C.S.

[Plates I.–VII.]

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I. INTRODUCTION.

The present paper is the third contribution to the description of the fauna of the Upper Valentian rocks of Shropshire, accounts of the corals (Smith, 1930, pp. 291–330) and the trilobites (Whittard, 1938, pp. 85–140) having already appeared. The stratigraphical succession shows a twofold division into the *Pentamerus* Beds followed above by the Purple Shales; within the former the Arenaceous Phase succeeded by the Mudstone Phase can be recognized (Whittard, 1927, p. 737, and 1932, p. 859).

The material for my studies has been obtained mainly from the collections of Professor W. F. Whittard, the Geological Survey Museum, the British Museum (Natural History), and myself. Many of the specimens occur as external moulds, and considerable difficulty was at first encountered in making casts of cavities which enlarge inwards and in obtaining impressions of delicate details. These difficulties have now been overcome by the use of a proprietary material manufactured by Revertex Sales Co., Ltd., to whom I wish to express my gratitude for having supplied this mixture. All the casts photographed for the illustration of the paper have been made of the above-mentioned material, and the photographs were taken immediately after the cast was prepared, thus reducing to a minimum any distortion due to shrinkage.

All new types and figured specimens not already in any of the museums have been presented to the Geo-

logical Survey Museum. In the text registration numbers are mentioned, and the following abbreviations indicate in which museum the specimens are to be found:—BM: British Museum (Natural History); GSM: Geological Survey Museum; SM: Sedgwick Museum.

II. ACKNOWLEDGMENTS.

I desire to express my warmest thanks particularly to Professor W. F. Whittard for the interest that he has shown in my work and for his kindness in placing much of the necessary material at my disposal; he has also supervised my studies. My thanks are also due to Mr. A. G. Brighton, Dr. E. R. Currie, Dr. K. P. Oakley, Dr. J. Pringle, Mr. A. W. Stelfox, Dr. C. J. Stubblefield, and Dr. E. Warburg for their readiness in sending me material, to Dr. Alan Wood for his help, and to Mr. E. W. Seavill who is responsible for the majority of the photographs. I also wish to acknowledge assistance from the Colston Research Fund administered by the Univeristy of Bristol.

III. THE GASTROPOD FAUNA.

In the list of gastropods given below the letters PB and pb denote that the particular form is characteristic or rare in the Pentamerus Beds, while PS and ps have the same meaning for occurrences in the Purple Shales.

- Liospira lenticularis* (J. de C. Sowerby). pb.
- Liospira uriconiensis*, sp. n. PB.
- Liospira cornovica*, sp. n. PB, ps.
- Lophospira woodlandi* Longstaff. PB.
- Lophospira trilineata*, sp. n. pb, ps.
- Lophospira* (?) *angulata*, sp. n. pb.
- Lophospira* sp. ind. pb.
- Lophospira pulchra* (McCoy). PB.
- Lophospira* sp. ps.
- Stenoloron aequilaterum* (Wahlenburg) var. *shelvensis*, nov. pb, PS.
- Phanerotrema jugosum*, sp. n. (ex Salter MS.). pb.
- Ulrichospira similis* Donald. pb ?, ps.
- Globispira acuta*, sp. n. pb.
- Hormotoma* cf. *grayiana* Donald. pb, ps.
- Euomphalopterus apedalensis*, sp. n. ps.
- Trochonema valenticum*, sp. n. PB.
- Eunema salopiensis*, sp. n. pb, ps.
- Eunema* (?) *multicarinatum*, sp. n. pb.
- Eunema* (?) *convexum*, sp. n. ps.

- Gyronema octavium* (d'Orbigny). pb.
Gyronema octavium (d'Orbigny) var. *multicarinata* (Lindström). PB.
Gyronema octavium (d'Orbigny) var. *minutum*, nov. pb.
Cyclonema crebristria (McCoy) var. *rugatum*, nov. pb, ps.
Anomphalus (?) sp. ind. pb, ps.
Holopella (?) *cancellata* (J. de C. Sowerby). PB, PS.
Fusispira acuminata, sp. n. pb.
Pagodea (?) *valentica*, sp. n. pb.
Platyceras cornutum (Hisinger). PB, ps.
Platyceras prototypum (Phillips). pb.
Sinuutopsis subquadratus, sp. n. ps.
Bucaniella trilobata (Conrad). pb, ps.
Bellerophon sp. pb.
Bucaniopsis carinatus (J. de C. Sowerby) var. *reedi*, nov. ps.
Temnodiscus cf. *nitidulus* (Ulrich). pb.
Trematonotus sp. ps.
Pterotheca avirostris, sp. n. (ex Salter MS.). ps.

GASTROPODA.

Family Pleurotomariidæ A. d'Orbigny.

Genus LIOSPIRA Ulrich, 1897.

Liospira lenticularis (J. de C. Sowerby). (Pl. I. fig. 1.)

1839. *Trochus lenticularis* Sowerby, p. 642, pl. xix. fig. 11.
 1850. *Pleurotomaria lenticularis* d'Orbigny, p. 7.
 ? 1852. *Pleurotomaria lenticularis* McCoy, p. 291.
 1854. *Scalites* (*Trochus*) *lenticularis* Murchison, pp. 194 & 488,
 pl. x. fig. 2.
 1854. *Raphistoma lenticularis* Morris, p. 275.
 1868. *Raphistoma lenticularis* Bigsby, p. 165.
 1872. *Raphistoma lenticularis* Murchison, pp. 212 & 533, pl. x. fig. 10.
 1884. *Raphistoma* (*Pleurotomaria*) *lenticularis* La Touche, p. 62,
 pl. vii. fig. 151.
 1888. *Raphistoma lenticularis* Etheridge, p. 115.
 1924. *Liospira lenticularis* Longstaff, p. 413, pl. xxxii. figs. 5 a-5 c.
 Non 1842. *Pleurotomaria lenticularis* Emmons, p. 393, text-figs. 101 &
 102.
 Non 1847. *Pleurotomaria lenticularis* Hall, p. 172, pl. xxxvii. figs. 6 a-
 6 d.

Shell discoidal, composed of about five rapidly increasing whorls coiled on nearly the same plane. Apical angle is 160°-170°. Body-whorl is flattened convex above the periphery, acutely angular at the periphery, moderately convex on the base and rounded at the edge of the umbilicus. A narrow band occurs on the outer margin of the body-whorl, its width extending to just below the periphery, slightly grooved and limited on the apical side by a fine thread and having a stronger thread on the periphery. Indistinct growth-lines curve

back to the upper side of the band *. The umbilicus occupies about one-third of the base, and is open and deep, revealing the earlier whorls. The aperture is unknown.

Geological Horizon and Locality.—Mudstone Phase of the Pentamerus Beds of Morrell's Wood near Leighton.

Material.—Twenty specimens, mostly fragmentary and imperfectly preserved, have been examined.

Holotype.—GSM: 6870 (Pl. I. fig. 1), from the Geological Society's Collection, shows the base embedded in matrix, and was collected from the Upper Valentian rocks at Sturedge Hill, Worcester. The greatest width is 29 mm., and it is interesting to compare this figure with the dimensions of one specimen (GSM: 56826) from Morrell's Wood which shows the greatest width 29 mm., least width 23 mm., and height 7 mm.

Remarks.—Mrs. Longstaff (1924, p. 413, pl. xxxii. figs. 5a-5c) referred to this species a Scottish specimen from the Penkill Group, Upper Valentian, of Penkill (Girvan), and which is now in the Hunterian Museum, University of Glasgow (S 622). It agrees very nearly in character and size with the holotype and also with the Morrell's Wood specimens. Additional details not exhibited on the latter are shown on the Girvan specimen, which, though but little better preserved than the holotype, exhibits the base, the band on the outer margin of the body-whorl, and traces of growth-lines. Consequently this specimen, of which the dimensions are greatest width 23 mm., least width 18 mm., and height 4 mm., has been utilized for the description of the band and the growth-lines in the specific characters outlined above. The threads on the band at the margin of the body-whorl are easily obliterated and have not been seen on the material from Shropshire.

Contrary to the impression conveyed by lists of Upper Valentian gastropods of Shropshire (Salter, 1866, pp. 362-3, and 1881, pp. 445-6, Morton, 1869, p. 21) and by Murchison's remark (1872, p. 212) "*Raphistoma lenticularis* . . . is everywhere met with in the Llandovery rocks" the species is not common, and has been found only in the Mudstone Phase of the Pentamerus Beds of

* The terms "upper and "lower" are used in the description of the whorls, the gastropod being orientated with the axis of coiling vertical and the apex pointing upwards.

Morrell's Wood. What have been recovered at Bog Mine and Norbury and referred to *L. lenticularis* are probably *Liospira cornovica* and *Stenoloron æquilaterum* (Wahlenburg) var. *shelvensis*; these will be described.

Liospira uriconiensis, sp. n. (Pl. I. figs. 2-5.)

Shell is discoidal, composed of about five rapidly increasing whorls coiled on nearly the same plane. Spire is very depressed and conical. Whorls are about twice as wide as high in section, equally convex above and below, and, when incompletely preserved, rounded at the periphery. A narrow band on the periphery of the body-whorl is composed of a raised central keel bounded by a groove on each side (Pl. I. fig. 5). Sutures are more or less sunken. Indistinct and rarely preserved growth-lines have been seen only near the aperture. On the upper side these are convex towards the aperture, curving back to the periphery; on the lower side they are known only on the inner region of the whorl, where they are seen to curve forwards from a radial direction into the umbilicus. The form of the inner lip is moderately well shown (Pl. I. fig. 3). The umbilicus, in which earlier whorls are seen, is about a quarter of the base, and is both open and deep.

Geological Horizon and Locality.—Mudstone Phase of the Pentamerus Beds of Morrell's Wood near Leighton.

Material.—Twenty-five specimens have been examined.

Syntypes.—GSM: 56828-56831.

Remarks.—Owing to the fact that the specimens are imperfectly preserved and more or less crushed, it is sometimes difficult to determine whether certain of the details are of structural significance. Under this heading falls the presence of two parallel grooves, which, placed just above the periphery on the penultimate and body-whorls, may vary in position due to the crushing which the specimens have suffered (Pl. I. fig. 2, GSM: 56828). It is difficult to determine the relationship of the grooves to the band, because in a few cases when the grooves are shown above the periphery, the band itself is not preserved below them. These grooves are mentioned in case better preserved specimens may show that they are not fortuitous.

The species differs from *Liospira lenticularis* (Sowerby) in being rounded at the periphery (excluding the band) instead of being acutely angular, in the form of the band, and in the shape of the whorls in section.

Liospira cornovica, sp. n. (Pl. I. figs. 6-10.)

Shell is sublenticular, composed of five, six, or seven whorls increasing at a moderate rate. Spire is depressed, conical, apical angle about 145° . Upper side of body-whorl gently convex and acutely rounded at the periphery; lower surface moderately convex, slightly angular at the edge of the umbilicus behind the aperture, becoming less angular with distance from the aperture until finally smooth about halfway round the umbilicus. Band slightly convex or plane, limited above by a fine thread when shell is preserved: when shell is absent this thread is represented by a shallow groove which apparently merges imperceptibly into the suture between the penultimate and body-whorls. Sutures between whorls are usually fine. Umbilicus is about a quarter of the base, shallow and concave.

Internal cast.—Shell is about three times as wide as high. Whorls are subrhomboidal in section (excepting the moderately convex base and the rounded edge of the umbilicus); body-whorl is nearly twice as wide as high in section, convex below the upper suture, very flattened convex or plane above the periphery, with an occasional shallow groove just above it; peripheral surface sharply rounded at or just below the middle of the whorl; more markedly convex on the base of the body-whorl than above the periphery, sometimes with a shallow or faint groove along the central part of the lower portion of the whorl (Pl. I. fig. 10) and rounded at the edge of the umbilicus. Umbilicus about one-third or a quarter of the base, open and deep, revealing the earlier whorls.

Geological Horizons and Localities.—Pentamerus. Beds of Morrell's Wood near Leighton (?), Norbury, and three localities near Minsterley (Hope Quarry, Hope Valley Brook, and at the back of a derelict stone building on the east of Josey's Wood Brook 180 yards east of where this stream joins the Hope Valley Brook); Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted

Outlier; arenaceous Purple Shales of the Bank Outlier (Speake's Rough) to the south-east of Minsterley, and the Bog Mine Outliers, Shelve.

Material.—This consists more commonly of internal casts and less commonly of internal moulds; more rarely true external moulds and testiferous shells are found.

Syntypes.—GSM: 56832–56838 and BM: G 4473.

Remarks.—Internal casts of the species have been described at some length because they are much more commonly found than testiferous shells or external moulds. As mentioned on p. 86, *Liospira cornovica* was probably one of two species from the Bog Mine Outliers and Norbury, which were referred erroneously to *Liospira lenticularis*. It resembles *L. lenticularis*, but may be distinguished by differences in details, such as the periphery of the body-whorl being sharply rounded instead of being acutely angular, by the whorl section, and by the increase in angularity of the whorl base at the edge of the umbilicus as the aperture is approached. Internal casts resemble *Liospira vitruvia* (Billings) (Ulrich and Scofield, 1897, p. 995, pl. lxxix. figs. 3–8), but they are generally smaller and the whorls are less sub-rhomboidal in section.

Genus LOPHOSPIRA Whitfield, 1886.

PERANGULATA Section Ulrich, 1897.

PERANGULATA Subsection Ulrich.

Lophospira woodlandi Longstaff. (Pl. II. figs. 1–4.)

1924. *Lophospira woodlandi* Longstaff, p. 418, pl. xxxiii. figs. 7 a & 7 b.

Shell is turreted, composed of about five whorls, and the breadth slightly exceeds the height. The body-whorl and the whorls of the spire show an angular profile. On the body-whorl there is occasionally a ridge just below the suture (Pl. II. fig. 3); another is present one-third or halfway between the suture and the angle; a third ridge is found below the angle, and on the penultimate whorl owing to the overlap of the body-whorl it is sometimes present just above the lower suture. Body-whorl is markedly concave on each side of the ridge above the angle and concave between the angle and the lowest ridge. Base is convex below. A narrow band is seen on the angle of the body-whorl, composed of a central

keel and a pair of less projecting keels of equal size at each side. Axial lines curve down and back to the upper side of the band, forward below the band, and radially below the lower ridge or curving back into the umbilicus.

Axial lines concave towards the aperture, forming crescents on the band. Spiral lines are weaker than axial lines above the lower ridge on the body-whorl, and as strong as them below, producing a reticulate ornamentation on the base. Similar axial lines occur on the penultimate whorl. Shape of aperture is not easy to determine owing to the crushing of the specimens, round or ovoid according to the distortion, acuminate above. Semi-circular callus covers the small umbilicus (Pl. II. fig. 2).

Geological Horizons and Localities.—Characteristic of the Mudstone Phase of the Pentamerus Beds of Morrell's Wood near Leighton; the Pentamerus Beds of Shineton (?) and (Mudstone Phase) near Hillend Cottage (?) between Plowden and Hamperley.

Material.—More than eighty specimens, nearly all of which come from Morrell's Wood, have been examined. Most of them are more or less crushed and not well preserved.

Remarks.—The apex is seldom preserved, and the ridges above and below the trilineate band on the body-whorl are easily obliterated. The nacreous layer is preserved in part on one specimen (GSM : 56839). Some specimens from Shropshire show more details than Longstaff's specimens (BM : G 25,388 and G 25,389) from the Saugh Hill Group, Middle Valentian, of Woodland Point (Girvan).

Lophospira trilineata, sp. n. (Pl. I. fig. 11.)

Shell of medium size, subconical, higher than wide, composed of six or seven whorls increasing at a moderate rate; apical angle 40°–55°. Angulation of the whorls occurs above the middle of the body-whorl and just below in the earlier whorls; immediately below the upper suture there may be either a strong spiral keel or a fine thread; a faint groove (not always present) occurs immediately below this keel. A moderately strong keel is also present below the angle in the body-whorl, and may be hidden by, or coincident with, the lower suture of the earlier whorls. Body-whorl is flat just below the above-

mentioned faint groove, concave farther below, concave between the band and the lower keel, and convex on the base. A prominent projecting band occurs on the angle, composed of three keels of nearly equal size of which the central is more projecting than the keel on each side. Growth-lines not discernible. Umbilicus is absent.

Geological Horizons and Localities.—Occasionally in the arenaceous Pentamerus Beds of the small faulted outcrop south-west of Lower Wood Farm between Betton and Wilmington, and in the arenaceous Purple Shales of the Bog Mine Outliers, Shelve.

Material.—Five external moulds from the Purple Shales and two external moulds from the Pentamerus Beds.

Holotype.—GSM : 56846.

Paratypes.—GSM : 56847 and 56848.

Remarks.—The species bears some resemblance to *Lophospira sedgwicki* (Longstaff, 1906, p. 562, pl. xliii. figs. 11 & 12), but may be distinguished by the presence of a trilineate band instead of a prominent flange-like keel on the angle of the whorls. An average specimen of *Lophospira pulchra* obtained from Norbury (see p. 92) resembles specimens of *L. trilineata* in size and in the shape of the shell. Indeed, Morton (1869, p. 21) seems to have included both of these species in *Pleurotomaria* sp. found at Bog Mine and Norbury in his list of Upper Valentian gastropods of Shropshire. *L. trilineata* differs from *L. pulchra* in having the three keels of the band of equal size instead of having a thin thread down the middle of the sinuate band.

Lophospira (?) *angulata*, sp. n. (Pl. II. figs. 5–7.)

Shell turbate, nearly as wide as high, composed of four or five whorls increasing somewhat rapidly. Aperture is higher than the spire and about three times as high as the penultimate whorl; whorls are angular. Ornamentation consists of numerous spiral keels, four on the penultimate whorl and about fifteen on the body-whorl; the grooves between the upper suture and the four upper keels are wider than the remainder; the spiral keels below the fourth groove are rather close together and are equidistant on the base. Band on the angle

of the body-whorl bounded above and below by a very fine thread. Growth-lines fine and indistinct, turning obliquely down and back from the upper suture to the first upper keel, and below the latter curving down and back to the band on which they form crescents; below this they curve forward over the third upper groove before going down nearly vertically over the base (Pl. II. figs. 6 & 7). Umbilicus is small.

Geological Horizons and Localities.—Pentamerus Beds of Hope Quarry, and at the back of a derelict stone building to the east of Josey's Wood Brook 180 yards east of where this stream joins the Hope Valley Brook near Minsterley.

Material.—Three specimens from the Pentamerus Beds.

Holotype.—GSM: 56849-56851.

Paratype.—GSM: 56852.

Remarks.—The species resembles *Gyronema octavium* (d'Orbigny) var. *multicarinata* (Lindström), which will be described later, but it may be distinguished by the whorls being more angular, by the growth-lines curving back above and below the band instead of turning obliquely down and back from the upper suture across the whorls, and by having a sinual, instead of a peripheral, band on the angle.

Lophospira sp. ind. (Pl. II. figs. 8-9.)

Shell turbinate, composed of two whorls (incomplete) increasing at a moderate rate; maximum breadth of shell is greater than height. The angle of the whorls occurs above the middle of the body-whorl and below the middle in the penultimate whorl. Body-whorl convex just below the suture and markedly concave above the periphery, which is raised a little above the lowest part of the concavity; body-whorl below periphery vertical or slightly inclined inward, is at first plane or flattened concave, and then becomes convex on the base. Penultimate whorl similar to the body-whorl (excluding the convex base) except that the concavity above the periphery is less marked and the periphery is not raised above the lowest part of this concavity. Axial lines seen only on the convex base, and consist of fine ridges alternating with equally fine, closely packed grooves, turning down vertically into the umbilicus.

Spiral grooves as fine as the axial lines, but rather wider apart, producing a reticulate ornamentation on the base. The umbilicus is very small.

Geological Horizon and Locality.—Pentamerus Beds of Minsterley (Hope?).

Material.—One specimen (BM : G 4482).

BICINCTA Section Ulrich, 1897.

TUBULOSA Subsection Ulrich.

Lophospira pulchra (McCoy).

A synonymy of the species is given by Longstaff (1906, p. 567), and to this may be added the following :—

1869. *Pleurotomaria* sp. Morton, p. 21.

1906. *Lophospira pulchra* Longstaff, p. 567, pl. xliv. figs. 10 & 11.

Geological Horizons and Localities.—Characteristic of the arenaceous Pentamerus Beds of Norbury; occasionally in the Pentamerus Beds of the Marshbrook Faulted Outlier (?).

Material.—More than sixty specimens (chiefly external moulds), the majority having been collected at Norbury, have been examined. Axial lines and a thin thread down the middle of the sinual band are rarely preserved on them.

? HOLMI Subsection Ulrich.

Lophospira sp. (Pl. II. figs. 10–11.)

Shell turbinate, composed of three whorls (probably four or five if complete). Body-whorl is slightly concavo-convex above the periphery, vertical (?) below the periphery, and convex on the base. Penultimate whorl convex just below the upper suture, flattened convex above the periphery; a faint, hardly perceptible convexity is present on the periphery and the whorl is flattened convex between it and the lower suture. Growth (?)—lines on the body-whorl fine and closely packed, turning back to the upper side of the periphery and forward below the periphery, then (?) turning less forward in nearly straight lines before curving at the edge of the umbilicus to turn radially into the umbilicus. Spiral lines consist of numerous ridges, but rather more prominent and wider apart than the growth-lines, producing a reticulate ornamentation. Sutures impressed in the whorls of the spire. Umbilicus between a third and a quarter of the base.

Geological Horizon and Locality.—Arenaceous Purple Shales of Speake's Rough (Bank Outlier) near Minsterley.

Material.—One specimen (Pl. II. figs. 10–11; BM: G 4471).

Remarks.—The specimen (BM: G 4471) is rather crushed; the shell is not preserved on the whorls of the spire. The periphery of the body-whorl is not shown so the form of the sinuall band, if there is one, is unknown. The species resembles *Lophospira cancellatula* var. *tenuistriata* (Longstaff, 1924, p. 420, pl. xxxiii. fig. 3), but may be distinguished by the greater strength of the growth-lines, and by the absence of a single spiral thread stronger than others midway between the periphery and the suture on the body-whorl. In Longstaff's variety the band is composed of four threads.

Genus STENOLORON Oehlert, 1887.

Stenoloron æquilaterum (Wahlenburg) var. *shelvensis*,
nov. (Pl. III. figs. 1–8.)

1869. *Euomphalus* sp. Morton, p. 21.

1884. *Euomphalus* ? La Touche, p. 85, pl. xxi. fig. 75S.

Shell heliciform, depressed-conical, composed of about five rounded whorls increasing at a moderate rate. Spire is low; apical angle varies between 125° and 145°; sutures are sunken. Narrow band occurs above the periphery, flat or gently depressed or raised, bounded on each side by a fine slightly raised thread, lying a little less than one-third of the distance from the lower to the upper suture in the penultimate whorl (Pl. III. fig. 3). Fine growth-lines, not usually preserved, curve back to the upper side of the band and less forward below the band, before turning down radially below the periphery to the base, and finally obliquely forward inside the umbilicus as straight lines.

Internal cast (Pl. III. figs. 4–8).—Shell is about twice as wide as high. Aperture is about twice or more as high as the spire. Whorls are rounded on the visible parts, and concave on the upper inner side which is hidden by overlying whorls (Pl. III. fig. 7). Periphery is situated just below the middle of the body-whorl and just above the lower suture in earlier whorls. Immediately above the periphery of the body-whorl the band is represented usually by a slight ridge (Pl. III. fig. 5),

which is occasionally prominent behind the aperture (Pl. III. fig. 8), and is bounded on each side by a very shallow groove. The grooves are more indistinct and more easily obliterated than the ridge, the latter generally being less distinct or absent on the penultimate whorl. In transverse section the body-whorl is nearly round except for the concave upper inner side, which is hidden by the overlying penultimate whorl, and which forms between one-fifth and a quarter of the circumference of the section. Umbilicus about a third of the base, open and deep, revealing all the whorls (Pl. III. fig. 6).

Geological Horizons and Localities.—Characteristic of the arenaceous Purple Shales of the Bog Mine Outliers, Shelfe; occasionally in the Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier, in the Pentamerus Beds of Norbury, and two localities in the Minsterley District (Hope Quarry, and at the back of a derelict stone building on the east of Josey's Wood Brook 180 yards east of where this stream joins the Hope Valley Brook), and the arenaceous Purple Shales of the Bank Outlier near Minsterley.

Material.—More than fifty specimens, the majority having been collected at the Bog Mine Outliers, have been examined. Most of them are internal casts.

Holotype.—GSM : 36023 A.

Paratypes.—GSM : 36018. GSM : 36020. GSM : 56853 B, 56854 B, and 56855 (counterparts). GSM : 56853 C, 56856 A, and 56857 (counterparts). GSM : 56853 D, and 56856 B (counterparts). GSM : 56859. BM : G 12564.

Remarks.—The material from Shropshire bears a close resemblance to the holotype of *Pleurotomaria æquilatera* Wahlenburg (Lindström, 1884, pp. 111–2, pl. ix. figs. 20–22), but the shell is apparently composed of fewer whorls (about five instead of seven), the whorls are not slightly flattened above the slit-band, the body-whorl is characteristically nearly round internally instead of being obscurely oval (as is indicated in Lindström's figure, *op. cit.* pl. ix. fig. 29), and, finally, the upper inner side of the internal cast of the body-whorl, which is hidden by the overlying penultimate whorl, is concave instead of being flat (*op. cit.* pl. ix. fig. 29). Such differences seem here to be of minor importance and the specimens are placed in a new variety of this species. Lindström mentions a great variation

existing in *P. æquilatera*, especially as to the width of the umbilicus and the height of the spire, but, although in the Shropshire specimens the height of the spire in proportion to that of the body-whorl is variable, the breadth of the umbilicus in proportion to the base is remarkably constant. According to Lindström the slit-band in *P. æquilatera* is narrow and open for a long way from the aperture in the body-whorl. This also seems to be the case in the Shropshire variety, in which the ridge above the periphery of internal casts is occasionally prominent for varying distances from the aperture up to about one-third of the way along the body-whorl (Pl. III. fig. 8; GSM: 56855), but beyond this the ridge is rather indistinct. The bordering lines of the slit-band in *P. æquilatera* are lamellar and projecting, and they seem to be less projecting in the Shropshire variety. The aperture is incompletely preserved, and it probably follows the direction of the growth-lines (see p. 93), and in this respect it agrees closely with *P. æquilatera*.

The variety differs from the genotype *Pleurotomaria* (*Stenoloron*) *Viennayi* (Oehlert, 1887, p. 94, pl. ix. figs. 2-2 b) in having the band just above the lower suture in the whorls of the spire instead of being halfway between the upper and lower sutures. Of British species, the type which approaches the Shropshire material is *Liospira* sp. from the Slade and Redhill Beds of Haverfordwest (Reed, 1906, p. 361, pl. xx. figs. 7 & 7 a), but this is a smaller species, and the band is hidden on the whorls of the spire instead of being above the lower suture. As explained on p. 86, *Stenoloron æquilaterum* var. *shelvensis* was probably one of two species from the Bog Mine Outliers and Norbury which were referred erroneously to *Liospira lenticularis*.

Genus PHANEROTREMA Fischer, 1885.

Phanerotrema jugosum, sp. n. (ex Salter MS.).

(Pl. III. figs. 9-14.)

1865. *Pleurotomaria jugosa* Huxley and Etheridge, p. 36.

1868. *Pleurotomaria jugosa* Salter MS., Bigsby, p. 162.

1869. *Pleurotomaria jugosa* Salter, Morton, p. 21.

1878. *Pleurotomaria jugosa* MS., Etheridge and Newton, p. 77.

Shell turbinate, composed of four or five whorls increasing rapidly. Whorls are angulated in profile, the angulation occurring well above the middle of the

body-whorl and below the middle of the earlier whorls. Aperture is about twice or three times as high as the spire. There are either two or three keels above the angle of the body-whorl. About eleven spiral keels occur below the angle, approximately as wide apart as the keels above the angle. Narrow band occurs on the angle, slopes downwards, and is grooved and bounded by a ridge on each side. Growth-lines turn back from the upper suture to the upper side of the band, form crescents on the band, bend forward between the band and the first spiral keel, then curve backward to the base. Aperture rather higher than wide, acuminate above, and angular at the angle of the body-whorl. Outer lip is thin and inner lip thick. Callus occurs on a part of the base in addition to the upper part of the inner lip (Pl. III. fig. 10). There is rarely a very narrow umbilicus which is nearly closed up.

Geological Horizons and Localities.—Pentamerus Beds of Norbury, and Snead Lane at Upper Snead Bridge to the north-west of Snead.

Material.—Thirteen external moulds, three internal casts and one external cast from Norbury, one external mould and one external cast from Snead.

Holotype.—GSM : 56860 and 56861.

Paratypes.—GSM : 36012 and 36013 (the specimens used by Salter for his MS. name), GSM : 56862 and 56863.

Remarks.—*Phanerotrema jugosum* has not been described or figured previously, but was merely named by Salter in MS. It is distinguished from *Pleurotomaria labrosa* (Hall, 1859, p. 339, and 1861, pl. lxvi. figs. 1-5, pl. lvii. figs. 6 a & 6 b) and a Gotlandian shell, which Lindström (1884, p. 113, pl. ix. figs. 30-38) erroneously identified with Hall's *labrosa*, by having a less number of keels below the angle of the body-whorl, and by the aperture being slightly higher than wide instead of being about as wide as high, and an additional difference from Hall's *labrosa* is that there are fewer keels above the angle of the body-whorl. Hall (1859, p. 339) says that the spiral ridges are equidistant in his species, but they are not always so in the Shropshire species, where some keels are sometimes markedly nearer to each other or farther apart than others. *Phanerotrema jugosum* also differs from *Pleurotomaria occidens* (Hall, 1867, pp. 343 & 364,

pl. 15 (6), figs. 11 and 12) in having two or three spiral keels above the angle of the body-whorl instead of numerous spirals.

Genus PLETHOSPIRA Ulrich, 1897.

Subgenus ULRICHOSPIRA Donald, 1905.

Ulrichospira similis Donald. (Pl. III. fig. 15.)

1905. *Ulrichospira similis* Donald, p. 569, pl. xxxvii. fig. 3.

Geological Horizons and Localities.—Purple Shales of Gippol's Dingle a mile to the north-east of Hughley $\frac{1}{4}$ mile from its junction with Hughley Brook, and Onny River Section near Cheney Longville (?); Pentamerus Beds of Morrell's Wood near Leighton (?).

Material.—In addition to a good specimen from Gippol's Dingle, two specimens have been examined and apparently belong to the species, but they are not preserved sufficiently well to admit identification beyond doubt.

Genus GLOBISPIRA Koken, 1925.

Globispira acuta, sp. n. (Pl. III. fig. 16.)

Shell turbate, slightly higher than wide, composed of about five convex whorls of which the body-whorl much exceeds the others in size. Apical angle is about 70° . The body-whorl, which is about twice as high as the spire, carries a slight swelling which adjoins the suture and is bounded below by a wide faint concavity; the remainder of the whorl is convex. Band is situated much below the middle of the body-whorl (about three-quarters of the height of the whorl) and hidden on the earlier whorls by their overlap; it is gently convex and slightly raised. On the body-whorl the growth-lines curve backwards from the upper suture, at first making a small angle with the vertical, but later it becomes very much greater. Indistinct spiral lines are seen on parts of the body-whorl above the band. Sutures are shallow. Aperture and umbilicus are not known.

Geological Horizon and Locality.—Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier.

Material.—One external mould.

Holotype.—GSM: 56866.

Remarks.—The species bears some resemblance to *Pleurotomaria exquisita* (Lindström, 1884, p. 125, pl. xi.

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figs. 30–33), but it differs in having a smaller apical angle, in the growth-lines being less convex above the band, and in the presence on the body-whorl of a swelling and a concavity below the suture.

Genus *HORMOTOMA* Salter, 1859.

Hormotoma cf. *grayiana* Donald.

1865. *Holopella* Huxley and Etheridge, p. 37.

1869. *Holopella* sp. Morton, p. 21.

1878. *Holopella* sp. Etheridge and Newton, p. 77.

1899. *Hormotoma grayiana* Donald, p. 270, pl. xxii. fig. 10.

Many indifferently preserved specimens have been collected, and they differ from *Hormotoma grayiana* in having a narrow groove or a broad concavity below the spiral thread which adjoins the upper suture (a feature absent in *H. grayiana*), but the condition of preservation hardly warrants the erection of a new name.

Geological Horizons and Localities.—Rarely from the Pentamerus Beds of Morrell's Wood near Leighton, from Norbury, and from the small faulted outcrop southwest of Lower Wood Farm between Betton and Wilmingtion; rather more commonly in the arenaceous Purple Shales of the Bog Mine Outliers, Shelve.

Material.—More than sixty specimens (chiefly external moulds), the majority having been collected at the Bog Mine Outliers, have been examined.

Remarks.—The sinual band is rarely preserved; indistinct growth-lines have been observed on the upper side of the body-whorl of only one specimen, and the whorls are generally smooth. An internal cast of the species differs from that of *Holopella cancellata* (Sowerby) in having higher and less rounded whorls. The apical angle is nearly identical in both species, and the differences between their internal casts are not always obvious.

Family *Euomphalopteridæ* Koken.

Genus *EUOMPHALOPTERUS* Roemer, 1876.

Euomphalopterus apedalensis, sp. n. (Pl. IV. figs. 1–3.)

Shell depressed, turbinate, composed of four or five whorls increasing rather rapidly; the breadth is slightly less than twice the height and the spire is short. Angle

of body-whorl is drawn out into a narrow marginal flange slightly below the middle. There is a strong broad ridge apparently immediately below the suture on the body-whorl, but this may be a marginal flange of the penultimate whorl overlapping the lower suture (Pl. IV. fig. 1). A strong ridge is found on the base round the umbilicus, a little knotty where axial lines cross it (Pl. IV. fig. 2). Body-whorl is convex above and below the flange and convex on the umbilicus immediately behind the aperture. Axial lines curve back from the suture to the upper side of the flange, turn backwards to the lower ridge from below the flange in broad concave curves, and form concave crescents on the ridge before going nearly radially or sinuously into the umbilicus. Whorls of the spire are convex on the apical side and become smoother (?) as the apex is approached. Lower portion of the aperture is apparently broadly sinuate. Ridge round the umbilicus corresponds with a narrow sinus of small depth in the lower part of the aperture. Labral profile apparently antecurrent. Umbilicus small but open and deep.

Geological Horizon and Locality.—Limestone band in the Purple Shales of Harley Brook about $\frac{1}{2}$ mile to the south of Harley.

Material.—Two fragmentary specimens besides the holotype.

Holotype.—GSM : 56867.

Paratype.—GSM : 56868.

Remarks.—The axial lines forming concave crescents on the lower ridge round the umbilicus and the presence of a narrow sinus of small depth on the aperture are two unique features in the genus. These are two out of several features which distinguish the species from *Euomphalopterus alatus* (Wahlenburg) (*Pleurotomaria alata* Lindström, 1884, pp. 116–8, pl. x. figs. 18–32) and *E. aliger* (Perner, 1903, pl. 65, figs. 14–18; pl. 78, figs. 14–17, 1907, p. 151, text-fig. 186). According to Lindström the marginal flange of the penultimate whorl in *E. alatus* overlaps the suture and appears as a ridge on the body-whorl. In the holotype (Pl. IV. fig. 1; GSM : 56867) of *E. apedalensis* the flange is not sufficiently preserved to show definitely whether it overlaps the outer suture of the penultimate whorl.

Family **Trochonematidae** Zittel.Genus **TROCHONEMA** Salter, 1859.*Trochonema valenticum*, sp. n. (Pl. IV. figs. 4-9.)

Shell turbate, slightly wider than high, composed of four or five whorls increasing at a moderate rate. Apical angle is 70° - 90° . Aperture is usually slightly higher than the spire. Whorls angular, with a flat or slightly concave peripheral band which is approximately vertical, and marked off above and below by a carina. A similar carina is present about halfway between the upper suture and the band; the three carinae are about equidistant and distinct in all the visible whorls, the lower carina of the band coinciding with, or occurring just above, the lower suture in the whorls of the spire. A strong ridge is present on the base round the umbilicus and is a little knotty where axial lines cross it. Whorls slightly concave or flat on each side of the upper carina, often markedly concave just above the band due to the elevation of the latter, and convex on the base. Axial lines run obliquely down and backward from the upper suture at a high angle to the upper carina; below the latter they are more oblique, and on the peripheral band equally, or slightly less, oblique, before they turn almost insensibly so as to be nearly radial just outside the lower ridge. Axial lines unite somewhat irregularly in twos or threes to form single axial lines at a varying distance from the lower ridge (Pl. IV. fig. 6). The axial lines form retral curves on the ridge before turning apparently radially or curving slightly forward into the umbilicus. Surface covered in part with very indistinct, fine spiral lines of irregular size. Umbilicus about a quarter of the base, open and deep.

Internal cast (Pl. IV. fig. 9).—Body-whorl angular just behind the aperture, with a peripheral band which is bounded above and below by a faint carina; the ridge round the umbilicus is absent. The whorls become more and more rounded as the apex is approached (Pl. IV. fig. 9; GSM: 56870).

Geological Horizons and Localities.—Characteristic of the Mudstone Phase of Pentamerus Beds of Morrell's Wood near Leighton, and rarely in the Pentamerus Beds of Snead (?).

Material.—More than ninety specimens from Morrell's Wood have been examined. One doubtful specimen has been collected at Snead.

Holotype.—GSM : 56869.

Paratypes.—GSM : D 3431, GSM : 56870–56872.

Remarks.—Mention has been made in the specific characters outlined above of axial lines uniting in twos and threes to form single lines between the peripheral band and the ridge round the umbilicus. This is a unique feature of the species and has been seen in only two specimens (Pl. IV. figs. 6 & 8 ; GSM : 56869 and D 3431).

The species resembles *Trochonema umbilicatum* (Hall) (Ulrich and Scofield, 1897, p. 1047, pl. lxxvii. figs. 1–8), but may be distinguished by the uppermost carina being about halfway between the upper suture and the band instead of being much nearer to the former than to the latter, by the axial lines uniting in twos and threes to form single lines between the band and the ridge round the umbilicus instead of remaining unchanged and single, and, in the internal cast, by the body-whorl being flat or slightly concave just above the band instead of being markedly concave.

Genus EUNEMA Salter, 1859.

Eunema salopiense, sp. n. (Pl. IV. figs. 10–14.)

1865. *Murchisonia* or *Eunema* Huxley and Etheridge, p. 37.

1869. *Murchisonia* or *Eunema* sp. Morton, p. 21.

1878. *Murchisonia* sp. Etheridge and Newton, p. 77.

Shell turbinate, a little higher than wide, composed of five or six whorls increasing at a moderate rate. Apical angle is 40°–60°. Whorls angular, with a wide flat band which is either vertical or slightly inclined inward and is bounded above and below by a carina ; a strong ridge is present one-third or nearly halfway between the upper suture and the band, and a slight swelling or a feeble ridge (not always seen) occurs immediately below the upper suture. Whorls are flat or gently concave between the swelling, the ridge, and the band, and convex on the base. In the whorls of the spire the lower limit of the band is just above the lower suture and overhangs or coincides with it. Distance between the band and the lower suture is variable from a lower position coinciding with the suture (Pl. IV. fig. 13), to one which is a third

or half the width of the band above the suture (Pl. IV. fig. 12). Occasionally on the penultimate and body-whorls there are indistinct traces of growth-lines which turn obliquely down and back in apparently straight lines from the upper suture to the peripheral band (sometimes curving down to the band), and pass down vertically across the band and the base. However, one external mould (Pl. IV. fig. 12; GSM: 36062A) shows the growth-lines curving backwards and upwards to the upper carina of the peripheral band. Outer lip apparently follows the direction of growth-lines. Umbilicus is usually absent or more rarely very narrow.

Geological Horizons and Localities.—Arenaceous Purple Shales of the Bog Mine Outliers, Shelve, and the Bank Outlier near Minsterley; Pentamerus Beds of Hope Quarry, Hope Valley Brook, the lower Hope Valley Outlier resting on the flank of the Hope Valley, and at the back of a derelict stone building to the east of Josey's Wood Brook 180 yards east of where this stream joins the Hope Valley Brook near Minsterley.

Material.—More than forty specimens, comprising internal casts and external moulds chiefly from the Bog Mine Outliers, have been examined. The remainder from the Bank Outlier are not so well preserved but their identity is not in doubt. Twenty specimens, comprising internal casts and internal moulds from Hope Quarry, Hope Valley Brook, the lower Hope Valley Outlier, and east of Josey's Wood Brook, agree so closely with internal casts from the Bog Mine Outliers that their identity seems certain, although as a rule it is unsafe to identify internal moulds or internal casts found without external moulds.

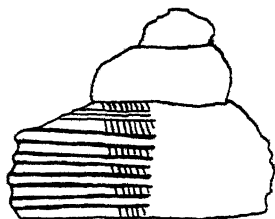
Syntypes.—GSM: 56873–56875 (counterparts), 56876 A, 36023 B & C, 36062 A & B, and 56853 A, 56854 A, and 56858 (counterparts).

Remarks.—In internal casts the lower limit of the peripheral band is sometimes more indistinct than the upper limit; there is also a rounded ridge or an indistinct swelling just below the upper suture, and the body-whorl is plane or flattened concave between this ridge and the band. The whorls gradually become more rounded as the apex is approached (Pl. IV. fig. 14). Internal casts bear some resemblance to *Pleurotomaria*

angulata Sowerby (Murchison, 1839, p. 641, pl. xxi. fig. 20), but they are all much smaller than Sowerby's specimen, which is 38 mm. high, the whorls increase less rapidly, and the apical angle is less. They also differ from internal casts of *Trochonema valenticum* (see p. 100) in being generally bigger (not always), having the height greater in proportion to the width, and a smaller apical angle. It is not always easy to distinguish fragmentary internal casts of both species, although the difference between complete internal casts of both species is unmistakable. The species also resembles *Eunema rupestre* (Eichwald) (Koken, 1925, p. 205, pl. xxxiv, figs. 8, 10 & 14), but the growth-lines pass down vertically instead of obliquely back across the peripheral band, fine spiral lines are not present on the whorls, and additional spiral keels (which are sometimes present in *E. rupestre*) are absent on the base.

Eunema (?) *multicarinatum*, sp. n.
(Pl. IV. fig. 15.)

The only available specimen is an external mould of which the base is not preserved. The ornamentation is shown better on the penultimate whorl than on the body-whorl (see text-fig.). Shell turbinate (?), composed



Eunema (?) *multicarinatum*, $\times 7$, to show the ornamentation on the penultimate whorl.

of about five whorls increasing at a moderate rate ; apical angle is 69° . Whorls are angular above the middle of the penultimate whorl and probably above the middle of the body-whorl, flat or slightly convex above the angle ; ornamented by spiral keels, of which there are six on the penultimate whorl, the full number of keels on the body-whorl not being known, since the base is not preserved

below the sixth keel. On the penultimate whorl two spiral keels are present close together above the angle. Peripheral band, situated about the middle of the whorls of the spire, is slightly concave, and composed of three keels of which the central one is slightly finer than the others, while the upper keel of the band is on the angle of the whorls. A keel is also shown between the band and the lower suture on the penultimate whorl. Axial lines turn obliquely back from below the upper suture straight across the penultimate whorl to the lower suture. The keels and axial lines become more indistinct as the apex is approached.

Geological Horizon and Locality.—Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier.

Material.—One external mould.

Holotype.—GSM: 56877.

Remarks.—The species differs from *Eunema salopiense* (see p. 101) in the greater number of spiral keels, in having the whorls flat or slightly convex instead of being slightly concave above the peripheral band, in having two keels instead of one between the upper suture and the band, in the peripheral band being slightly concave and composed of three keels instead of being flat and bounded by two carina, and in the presence of an additional keel below the band.

Eunema (?) convexum, sp. n.
(Pl. IV. figs. 16–17.)

Shell turbate, higher than wide, composed of about six rounded whorls increasing at a moderate rate; apical angle is 50° – 60° . Sutures are deep. Aperture is about as high as the spire. A rather wide but indistinct peripheral band is situated about the middle of the body-whorl, and is composed of three indistinct ridges; the lower two ridges become fainter farther away from the aperture and are absent on the earlier whorls, and the upper ridge occurs below the middle of the earlier whorls. An indistinct ridge is also present one-third of the way from the band to the upper suture, forms a very slight subangularity of the body-whorl, and is slightly more prominent than the band. The body-whorl is somewhat flattened convex above this latter ridge; a much more

distinct keel is shown at the edge of the umbilicus (Pl. IV. fig. 17). Indistinct growth-lines turn obliquely back across the whorls from below the upper suture. Labral profile is antecurrent, and there is a small umbilicus.

Geological Horizons and Localities.—Arenaceous Purple Shales of Bog Mine Outliers, Shelve, and the Bank Outlier near Minsterley (?).

Material.—Numerous external moulds and internal casts are available besides the holotype (external mould).

Holotype.—BM : G 12570.

Remarks.—The species differs from *E. salopiense* (see p. 101) in having rounded instead of angular whorls, a more indistinct peripheral band which is composed of three indistinct ridges instead of two distinct carinæ, a more indistinct ridge between the upper suture and the band, and a keel round the umbilicus (a feature absent in *E. salopiense*). The species also differs from *E. (?) multicarinatum* (see p. 103) in having rounded instead of angular whorls, a more indistinct peripheral band, and an indistinct ridge instead of two distinct ones between the upper suture and the band. It resembles *E. Lyelli* (Perner, 1903, pl. 71, figs. 5–6, 1907, p. 215, pl. 109, case I, figs. 3–4 ; 1–2 ?), but the whorls are more rounded, the sutures are deeper, the ornamentation is much less distinctly shown, and an indistinct spiral thread is not intercalated between the two upper ridges.

Genus GYRONEMA Ulrich, 1897.

Gyronema octavium (d'Orbigny).

A synonymy of the species is given by Lindström (1884, p. 178), and to this may be added the following :—

1884. *Cyclonema carinatum* Lindström, p. 178, pl. xviii, figs. 28 & 29.
1905. *Gyronema octavia* Donald, p. 573, pl. xxxvii, figs. 10 & 11.

Geological Horizon and Locality.—Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier.

Material.—Three external moulds.

Remarks.—*Gyronema octavium* has been recorded from the Upper and Lower Ludlow, Aymestry Limestone, and doubtfully from the Wenlock Limestone and Wenlock Shale. According to Lindström it is found in all the Silurian strata of Gotland. It does not appear to have

been recorded in the Valentian rocks of the British Isles before.

Gyronema octavium (d'Orbigny) var. *multicarinata*
(Lindström). (Pl. V. figs. 1-3.)

1878. *Cyclonema* sp. Etheridge and Newton, p. 77.

1884. *Cyclonema carinatum* (Sowerby) var. *multicarinatum* Lindström, p. 179, pl. xviii. figs. 31 & 32.

Shell turbinate, about as wide as high, composed of four or five convex whorls increasing somewhat rapidly. Whorls are ornamented by spiral keels, of which there are five on the penultimate whorl and ten to eighteen on the body-whorl. The grooves between the upper suture and the four upper keels are comparatively wide and vary somewhat in size; the groove between the second and third upper keels forms a peripheral band (not easily recognized) much above the middle of the body-whorl, and about the middle of the penultimate whorl. The remaining keels on the body-whorl below the fourth are closer together and equidistant. Axial lines usually indistinct, and run slightly obliquely down and back from the upper suture to below the peripheral band (Pl. V. fig. 3) before curving downward (?) on the base and going radially (?) into the umbilicus. Outer lip is entire and labral profile antecurrent. Umbilicus small.

Geological Horizons and Localities.—Characteristic of the Mudstone Phase of the Pentamerus Beds of Morrell's Wood near Leighton; occasionally in the Mudstone Phase of the Pentamerus Beds to the west of Kenley Gorse about $\frac{1}{2}$ mile east of Kenley, and the Marshbrook Faulted Outlier.

Material.—More than forty specimens from Morrell's Wood, ten from Marshbrook, and one from the west of Kenley Gorse have been examined.

Remarks.—The variety *multicarinata* of Lindström differs from *Gyronema octavium* (d'Orbigny) (Donald, 1905, pp. 573-5, pl. xxxvii. figs. 10 & 11) in the greater number of spiral keels and, according to Lindström, in having a nearly circular instead of a nearly ovate aperture. Lindström (1884, p. 179) says that many forms connect the variety with *Gyronema octavium*. It does not appear to have been recorded in the British Isles before, and is recorded by Lindström from the

Upper Valentian or Wenlock Shales of Djupvik in Eksta, Gotland.

Gyronema octavium (d'Orbigny) var. *minutum*, nov.

(Pl. V. figs. 4-7.)

Shell small, turbate, a little higher than wide, composed of four or five convex whorls increasing somewhat rapidly. Apical angle is 55° - 65° . Body-whorl is subangular in profile and carries an ornamentation consisting of numerous spiral keels numbering about sixteen on the body-whorl and four on the penultimate whorl. Three keels occur above the peripheral band on the body-whorl, the uppermost one adjoining the suture; the band shows three keels, of which the central one is sometimes weaker than the others. About nine equidistant keels are present below the band and there is a strong keel round the umbilicus (Pl. V. fig. 5). On the penultimate whorl the peripheral band is inclined outward and occasionally contains an indistinct central keel; one keel occurs between the upper suture and the band; another is also present above the lower suture. Indistinct growth-lines turn obliquely down and back across the whorls. Umbilicus is small.

Geological Horizon and Locality.—Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier.

Material.—Four external moulds.

Holotype.—GSM : 56882.

Paratypes.—GSM : 56883-56885.

Remarks.—The variety differs from *Gyronema octavium* and its variety *multicarinata* (see p. 106) in having three keels instead of one above the peripheral band, in the peripheral band on the body-whorl being composed of three keels instead of two, and in being usually smaller; an additional difference from *G. octavium* is that there are more keels on the body-whorl.

Genus CYCLONEMA Hall, 1852.

Cyclonema crebristria (McCoy) var. *rugatum*, nov.

(Pl. V. figs. 8-10.)

1873. *Cyclonema crebristria* Salter, p. 90.

Shell turbate, about as wide as high, composed of about five whorls increasing rapidly. Apical angle

varies from 70° to 90° . Aperture is higher than the spire; body-whorl is almost flat above the markedly convex periphery. Whorls ornamented by numerous spiral keels which are alternately stronger and weaker on the upper parts of the whorls. Ornamentation on the base is somewhat variable; on one hand the keels are alternately stronger and weaker as seen on the upper part of the whorl (Pl. V. fig. 10), on the other there is a gradual transition to keels of equal size (Pl. V. fig. 9), and even these are not always equidistant. Growth-lines behind the aperture are coarse at irregular intervals, decreasing in size with distance from the aperture, curving back from just below the upper suture, and turning obliquely back to the base in nearly straight lines. Outer lip is entire and labral profile antecurrent. There is no umbilicus.

Geological Horizons and Localities.—Pentamerus Beds of Norbury and arenaceous Purple Shales of the Bog Mine Outlier one-third of a mile north 45° east of Ritton Castle, Shelve.

Material.—Four external moulds, two internal casts, one testiferous shell, and an internal cast with part of the shell on the body-whorl from Norbury; one external mould is available from the Purple Shales.

Holotype.—GSM: 56886–56888.

Paratypes.—GSM: 56889–56892.

Remarks.—The British species which closely approaches the Shropshire material is *Turbo crebristria* (McCoy, 1852, p. 295, pl. 1 K, fig. 36 and pl. 1 L, fig. 22) from the Bala rocks of Wales, but only coarse growth-lines are shown in the Shropshire variety while numerous fine and sharp axial lines are present between coarse growth-lines on the body-whorl in McCoy's species; this is a constant and important difference. An incomplete Norbury specimen (SM: A 14920) was referred to *Cyclonema crebristria* by Salter (1873, p. 90) but this should be placed in the new variety. The spiral keels are of equal size on the base in the Norbury specimens, but in the only available external mould from the Bog Mine Outlier (Pl. V. fig. 10; GSM: 56892) they are of alternate size everywhere on the body-whorl and are slightly closer together on the base.

Family **Umbonidæ** Adams.

Genus **ANOMPHALUS** Meek & Worthen, 1866.

Anomphalus (?) sp. ind. (Pl. V. figs. 11-14.)

Internal cast.—The shape is heliciform, being about one and a half times as wide as high, composed of about five strongly embracing convex whorls increasing at a moderate rate. Spire is depressed-conical. Aperture is about twice as high as the spire. Whorls nearly circular in transverse section except for the upper, inner side, which is hidden by overlying whorls and which is concave; the periphery of the penultimate whorl coincides with the lower suture; the lower half of each earlier whorl is hidden by the preceding whorl, producing deep and nearly vertical sutures. Umbilicus about one-fifth or less of the base, tapering off rapidly, so that practically only the penultimate whorl is seen in the umbilicus.

Geological Horizons and Localities.—Arenaceous Purple Shales of the Bog Mine Outlier $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, Shelve, and the Bank Outlier near Minsterley, and the Pentamerus Beds at the back of a derelict stone building on the east of Josey's Wood Brook 180 yards east of where this stream joins the Hope Valley Brook.

Material.—Two internal casts and one internal mould from the Bog Mine Outlier, one internal cast from the Bank Outlier, and one internal cast from the Pentamerus Beds.

Remarks.—A fragment of the test is shown on a part of the base of one specimen (Pl. V. fig. 14; GSM: 56894) and shows growth (?) lines more or less radial on the base of, and just inside, the body-whorl, curving to turn obliquely forward into the umbilicus. The Shropshire material bears some resemblance to *Anomphalus solaroides* * (Hall) (Whiteaves, 1895, p. 88, pl. xiii. figs. 3-8), but it differs in being much smaller, in having fewer whorls, and in showing a smaller umbilicus which is asymmetrical instead of symmetrical.

* *Pycnomphalus* is a synonym of *Anomphalus* (Knight, 1933, p. 42, and 1936, p. 527).

Family Streptacididæ (?) Knight, 1931.

Genus HOLOPELLA McCoy, 1851.

Holopella (?) *cancellata* (J. de C. Sowerby).
(Pl. V. figs. 15-19, and Pl. VI. figs. 1-4.)

1839. *Turritella cancellata* Sowerby, p. 642, pl. xx. fig. 18.
 1848. *Murchisonia* ? *polyglypha* Phillips, p. 357, pl. xiv. fig. 3.
 1849. *Turritella cancellata* Brown, p. 253, pl. xxxiii.* fig. 75.
 1850. *Loxonema cancellata* d'Orbigny, 1847, p. 5.
 ? 1852. *Holopella cancellata* McCoy, p. 303.
 1854. *Holopella* (*Turritella*) *cancellata* Murchison, pp. 88, 194, & 489.
 Foss. 8, fig. 8 in the text (p. 87), pl. x. fig. 4.
 1854. *Holopella cancellata* Morris, p. 252.
 1865. *Holopella cancellata* Huxley and Etheridge, p. 37.
 1866. *Holopella cancellata* Salter, pp. 362-3.
 1868. *Holopella cancellata* Bigsby, p. 155.
 1869. *Holopella cancellata* Morton, p. 21.
 1872. *Holopella cancellata* Murchison, p. 212; Foss. 15, fig. 8 in the
 text (p. 90), pl. x. fig. 14.
 1873. *Holopella cancellata* Salter, p. 90.
 1875. *Holopella cancellata* Baily, p. 49, pl. xvi. figs. 5 a-5 b.
 1878. *Holopella cancellata* Etheridge and Newton, p. 77.
 1881. *Holopella cancellata* Salter, pp. 437, 441, & 445-6.
 1884. *Holopella cancellata* La Touche, p. 62, pl. vii. fig. 148.
 1888. *Holopella cancellata* Etheridge, p. 112.
 1938. *Holopella cancellata* Stubblefield, p. 39.

Shell acutely conical, composed of several convex whorls (full number of whorls not known). Apical angle is 15°-20°. Whorls of the spire are broader than high, while the body-whorl is about as wide as high. On each whorl of the spire five or six spiral keels are present. Uppermost spiral keel, adjoining the upper suture, is slightly thicker than the others; the latter keels are nearly equidistant, the sixth occurring immediately above, or coinciding with, the lower suture, and sometimes adjoins the uppermost spiral keel on the lower whorl. Periphery is at the level of the third upper spiral space, which occurs below the middle of the whorls of the spire, and in the middle of the body-whorl. Nine to eleven spiral keels are shown on the body-whorl, and those below the sixth keel are closer together on the base. Numerous axial lines are present crossing the spiral keels, and consist of fine, equidistant, distinct and raised lines, which are much finer than and greatly outnumber the spirals, gently concave forward and generally curving down radially on the base. Aperture is oval internally. Columella is inclined obliquely forward (Pl. VI. fig. 2). There is no umbilicus.

The test of the shell is composed of two layers—a thin outer layer and a thick inner layer (Pl. VI.

figs. 1 & 2; GSM : 56899 & 56900). The outer layer shows the characteristic ornamentation, but only conveys to the inner layer a more or less distinct impression of the spiral keels (Pl. VI. figs. 3 & 4; GSM : 36049 and BM : G 43211).

In the young stages of the shell (Pl. V. fig. 17; GSM : 56896) the spiral keels are more prominent than in the adult; the axial lines occur at the same distance apart and are of the same size, but they necessarily increase in number with growth in the ephebic stage, the spiral keels remaining of nearly the same size and are thus spaced farther apart.

Geological Horizons and Localities.—Arenaceous Purple Shales of the Bog Mine Outliers, Shelve, and the Bank Outlier near Minsterley; Pentamerus Beds of Morrell's Wood near Leighton, Norbury, Ox Wood Dingle between Wilmington and Wotherton, the small faulted outcrop south-west of Lower Wood Farm between Betton and Wilmington, a tributary of the Rea Brook by the lane leading north-eastward from Betton Wood Farm, the lower Hope Valley Outlier resting on the flank of the Hope Valley, Hope Quarry, Hope Valley Brook, and at the back of a derelict stone building on the east of Josey's Wood Brook 180 yards east of where this stream joins the Hope Valley Brook. Although it is by no means abundant at any locality, *Holopella* (?) *cancellata* is the most ubiquitous Upper Valentian gastropod of Shropshire.

Material.—More than eighty specimens, chiefly external moulds, have been examined.

Holotype.—GSM : 6886 (Pl. V. fig. 15) in the Geological Society's collection from Mandinam, Llandoverly. The other and smaller specimen which Sowerby figured (pl. xx. fig. 18) is lost.

Remarks.—The spiral keels are not always equidistant on each whorl of the spire. Occasionally some keels below the second upper keel are closer together than on an average specimen, so that a keel has the deceptive appearance of being inserted between two spiral keels in one or more spiral spaces (Pl. V. fig. 19; GSM : 56898). Specimens showing only the inner layer of the test are not common, and such an example (Pl. VI. fig. 3; GSM : 36049) from the Upper Valentian of Gunwick Mill near Alfrick, Worcestershire was described

and referred to a new species *Murchisonia* ? *polyglypha* by Phillips (1848, p. 357, pl. 14, fig. 3). Its true identity was realized by others, including Morris (1854, p. 252), Huxley and Etheridge (1865, p. 37), and Etheridge (1888, p. 112), who referred it to *Holopella cancellata*. Another example of this sort of preservation is BM: G 43211 (Pl. VI. fig. 4).

Holopella (McCoy, 1851, p. 47, and 1852, p. 303) requires to be redefined and placed on a firm footing. One of its characters is the presence of slightly arched axial lines crossing the whorls. The genotype is *Holopella gracilior* (SM: A 6379) from Ludlow rocks of Dinas Bran, Llangollen, Denbighshire (McCoy, 1851, p. 47, and 1852, p. 303, pl. 1 K, fig. 33; Knight, 1937, p. 710). Unfortunately it is so badly preserved that its characters are very difficult to define. It is largely an internal cast (Pl. VI. fig. 5), and it is clear from the state of preservation that McCoy utilized other species for his diagnosis of *Holopella*.

In *H. cancellata* the axial lines are gently concave towards the aperture and the whorls are ornamented by spiral keels. The presence of spiral keels seems to be a character of some importance, and is not mentioned in McCoy's diagnosis of *Holopella*. *H. cancellata* is hardly a good example of *Holopella*, and comes nearest to Carboniferous examples placed in *Rhabdospira* (Donald, 1898, p. 65)*, which is characterized by the presence of spiral keels and very slightly sigmoidal axial lines. It resembles the Carboniferous *Rhabdospira compacta* (Donald, 1898, p. 66, pl. v. figs. 5 & 5 a), but differs in being bigger and in having fewer and less equidistant spiral keels on the whorls of the spire. The outer lip of *R. compacta* is less sigmoidal than that of the genotype *R. selkirkii*. It is not known whether the Carboniferous subgenus ranges so far back into the Silurian and for the present *H. cancellata* is referred provisionally to *Holopella*.

Family Subulitidæ Lindström.

Genus FUSISPIRA Hall, 1871.

Fusispira acuminata, sp. n. (Pl. VI. figs. 6-7.)

Internal cast.—Fusiform and slender, about three times as high as wide, composed of about eight very

* *Rhabdospira* is a subgenus of *Aclisina*.

slightly convex, almost flat, smooth whorls. Spire is elevated; apical angle is 20° – 30° ; whorls are high. Lowest part of the whorls of the spire turns inward just above the lower suture which is deep, open, and oblique; deep and open sutures in this cast indicate a rather thick shell. Body-whorl is twice as high as wide and about three-fifths of the height of the shell. Lower part of the body-whorl tapers and turns inwards, producing a concavity in the columellar side of the aperture and giving the appearance of an anterior canal (basal end of body-whorl is broken off). Columella is slightly twisted. Aperture obliquely longitudinal, about two and a half times as long as wide, widest in the middle, sub-elliptical, acuminate above, may be produced below (base is broken off). There is no umbilicus.

Geological Horizons and Localities.—Rare in the Mudstone Phase of the Pentamerus Beds of Morrell's Wood near Leighton, and the stream near the southern end of Botany Bay Wood $\frac{3}{4}$ miles east of Leighton.

Material.—Five internal casts have been examined; four of them are incomplete.

Holotype.—GSM : 56901 (crushed).

Paratype.—GSM : 56902 (composed of two whorls).

Remarks.—The whorls of the spire of the uncrushed paratype (Pl. VI. fig. 7; GSM : 56902) resemble those of *Fusispira angusta* (Ulrich and Scofield, 1897, p. 1079, pl. lxxxi. figs. 28–32), but the body-whorl is much bigger in proportion to the spire.

Family Epitoniidae Dall.

Genus PAGODEA Perner, 1907.

Pagodea (?) *valentica*, sp. n. (Pl. VI. figs. 8–10.)

Shell turbinate, rather wider than high(?), composed of about seven convex whorls increasing at a moderate rate. Apical angle is about 90° . Aperture is slightly higher than the spire. There is a spiral keel which imparts a slight subangularity above the middle of the penultimate and body-whorls (Pl. VI. fig. 8). An indistinct spiral groove is present on the periphery, occurring just below the middle of the body-whorl and well below the middle of the penultimate whorl; it is more indistinct on the latter than on the former, and is found about halfway between the upper keel and the

lower suture. Another indistinct keel occurs below the groove on the body-whorl, and a keel is also shown round the umbilicus (Pl. VI. fig. 10). Regular, sub-lamellose axial lines with about equal interspaces curve down and back just below the suture, run obliquely back across the whorls, and then become radial on the base. Base covered in part by indistinct spiral lines. The spiral ornament and the axial lines become more and more indistinct as the spire is approached. Labral profile antecurrent. Small umbilicus.

Geological Horizon and Locality.—Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier.

Material.—Two external moulds (one of them showing the apical side and the other the base only).

Holotype.—GSM : 56903.

Paratype.—GSM : 56904.

Remarks.—The species differs from *Elasmonema bellatulum* * (Hall, 1879, p. 51, pl. xiv. figs. 10–15) by the greater apical angle and the presence of spiral ornament. It also resembles *Pagodea concomitans* (Perner, 1907, p. 304, text-fig. 228; 1903, pl. lxiv. figs. 21–2), but may be distinguished by the shell being shorter in proportion to its breadth, the apical angle being greater, the sutures being deeper, a central spiral groove being present instead of a central keel, and an umbilicus being present instead of absent. It is distinguished from members of *Elasmonema* by the presence of spiral ornament, and from members of *Pagodea* by the presence of an umbilicus. There is some doubt concerning the generic position of the species and it is provisionally referred to *Pagodea*.

Family Platyceratidae Hall.

Genus PLATYCERAS Conrad, 1840.

Platyceras cornutum (Hisinger).

A synonymy of the species is given by Lindström (1884, pp. 63–4), and to this may be added the following :—

1866. *Acroculia haliotis* Salter, p. 362.

1868. *Acroculia haliotis* Bigsby, p. 150.

* *Callonema* Hall, 1879, is a homonym of *Callonema* Conrad, 1875. The name *Elasmonema* was proposed by Fischer in 1887 for *Callonema* Hall, preoccupied (Knight, 1933, p. 35 and footnote, and 1936, pp. 526 & 533).

1878. *Acroculia haliotis* Etheridge and Newton, p. 77.

1881. *Acroculia haliotis* Salter, pp. 441 & 445.

1884. *Platyceras cornutum* Lindström, pp. 63-7, pl. ii. figs. 29-51; pl. iii. figs. 6-9, 19-26.

1888. *Acroculia haliotis* Etheridge, p. 110.

Geological Horizons and Localities.—Pentamerus Beds to the south of Spout Lane near Little Wenlock, of Morrell's Wood near Leighton, in the south of Botany Bay Wood $\frac{3}{4}$ mile east of Leighton, the Marshbrook Faulted Outlier, Norbury, and three localities in the Minsterley District (the lower Hope Valley Outlier resting on the flank of the Hope Valley, Hope Valley Brook, and at the back of a derelict stone building on the east of Josey's Wood Brook 180 yards east of where this stream joins the Hope Valley Brook); the Purple Shales of the tributary of Harley Brook flowing eastward from Merrishaw $\frac{1}{4}$ mile from its junction with Harley Brook (the junction being $\frac{1}{2}$ mile south of Harley), the arenaceous Purple Shales of the Bog Mine Outlier $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, Shelve, and the Bank Outlier near Minsterley.

Material.—75 specimens have been examined.

Platyceras prototypum (Phillips). (Pl. VI. fig. 11.)

A synonymy of the species is given by Lindström (1884, p. 67), and to this may be added the following:—

1884. *Acroculia prototypa* La Touche, p. 72, pl. xiv. fig. 479.

1884. *Platyceras prototypum* Lindström, p. 67, pl. iii. figs. 10-18.

1938. *Platyceras prototypum* Stubblefield, p. 30.

Geological Horizons and Localities.—Rare in the Mudstone Phase of the Pentamerus Beds of Morrell's Wood near Leighton, and in the arenaceous Pentamerus Beds of Norbury.

Material.—One testiferous shell from Morrell's Wood and two external moulds from Norbury.

Holotype.—GSM: GSb 4394 (Pl. VI. fig. 11), from Woolhope Limestone, Presteign, Radnorshire.

Remarks.—The Shropshire material resembles Sowerby's specimen (Murchison, 1839, pl. xii. fig. 15) more closely than Lindström's figures (1884, pl. iii. figs. 10-18). Etheridge (1888, p. 110) recorded this species as occurring in the Woolhope and Wenlock Limestones of England but it does not appear hitherto to have been recorded

from the Valentian rocks of England. According to Lindström it is found in all the Silurian strata of Gotland.

Suborder BELLEROPHONTACEA Ulrich & Scofield,
1897*.

There are many specimens in my collection which are to be included in the Suborder Bellerophontacea, but unfortunately much of the material is fragmentary, and consequently I have deferred describing certain new species. It should be understood that such species as are described here do not represent all the variety of forms present in the Shropshire fauna.

Group I. *INTEGRIDORSATA* Reed, 1921.

Genus *SINUITOPSIS* Perner, 1903.

Sinuitopsis subquadratus, sp. n. (Pl. VI. figs. 12-14.)

Shell evolute, composed of two or three rounded whorls touching one another and increasing in size slowly from the apex and then more rapidly to the aperture. Umbilicus small and not deep, about one-sixth or less of the breadth of shell, exposing inner whorls; umbilical edges rounded. Aperture as wide as high, large but scarcely expanded, subquadrate in section, with two adjacent sides (outer lip) much longer than the other two sides (inner lip); the longer sides are gently concave along their mid-length, and form an U-shaped periphery † in the angle between them; the shorter sides form an obtusely V-shaped inner lip with a rounded corner in the angle; the upper and lower margins of the aperture are subangular (more or less at 90°); the slight concavity on each side of the periphery and the subangularity at the top and bottom of the aperture become less pronounced and soon disappear along the body-whorl. Fine growth-lines are concave on the periphery and more or less radial on the umbilical edges. Test is thick.

* Illustrations on the plates in the present paper are arranged with the axis of coiling vertical, and this is consistent with the usual method of figuring gastropods, but is contrary to that adopted for the Bellerophontacea.

† The term "dorsum," employed by Reed, is not adopted here, because this suggests that the periphery is dorsal, which is incorrect.

Geological Horizon and Locality.—Limestone bed in the Purple Shales of Harley Brook about $\frac{1}{2}$ mile to the south of Harley.

Material.—Four specimens.

Holotype.—GSM : 56905.

Paratype.—GSM : 56906.

Remarks.—The growth-lines on the body-whorl of the paratype (Pl. VI. fig. 14 ; GSM : 56906) are somewhat irregular. Although the holotype (Pl. VI. fig. 13 ; GSM : 56905) shows the shape of the aperture in transverse section the margin of the aperture is not preserved. Judging from the direction of growth-lines on the periphery there is probably a shallow sinus in the outer lip. The species is distinguished from *Sinuities neglecta* (Perner, 1903, p. 68, pl. lxxxv. fig. 11 ; pl. lxxxviii. figs. 28–30, 38–40 ; pl. xcvi. figs. 39–41 ; text-figs. 42–46) and *S. congruens* (Reed, 1921, p. 18, pl. iii. figs. 15 a and 15 b) by the difference in the shape of the aperture in transverse section, and in the absence of the band-like structure on the last half of the body-whorl (at least it has not been seen in the incompletely preserved Shropshire specimens).

Genus BUCANIELLA Meek, 1870.

Bucaniella trilobata (Conrad). (Pl. VII. figs. 1–4.)

A synonymy of Sowerby's species is given by Lindström (1884, p. 80) and Reed (1921, p. 28), and that of Conrad's species is given by Swartz and Prouty (1923, p. 482), and to these may be added the following :—

- 1865. *Bellerophon trilobatus* Huxley and Etheridge, p. 37.
- 1866. *Bellerophon trilobatus* Salter, pp. 362–3.
- 1868. *Bellerophon trilobatus* Bigsby, p. 145.
- 1869. *Bellerophon trilobatus* Morton, p. 21.
- 1878. *Bellerophon trilobatus* Etheridge and Newton, p. 78.
- 1881. *Bellerophon trilobatus* Salter, pp. 437 & 445–6.
- 1884. *Bellerophon trilobatus* Lindström, p. 80, pl. iv. figs. 13–15.
- 1888. *Bellerophon trilobatus* Etheridge, p. 120.
- 1921. *Bucaniella trilobata* Reed, pp. 28–30, pl. v. fig. 12, pl. vi. figs. 1–3.
- 1923. *Bucaniella* [sic] *trilobata* Swartz and Prouty, p. 482, pl. xxix. figs. 1–6.
- ? 1924. *Plectonotus trilobatus* McLearn, p. 140, pl. xx. figs. 18 & 30–2.
- ? 1933. *Plectonotus trilobatus* Straw, p. 125, pl. ix. figs. 27 & 28.

Shell involute, composed of laterally compressed whorls increasing slowly in size from the apex and then

more rapidly to the aperture; whorls divided into three lobes by two revolving grooves. Median lobe more prominent and increasing more slowly to the aperture than the other lobes. The periphery of the median lobe, behind the aperture, occupies about half the height of the lobe, and is bounded above and below by a flat, bevelled surface; the profile of the lobe becomes more rounded with distance from the aperture. Umbilicus deep and open, about a quarter or less of the breadth of shell; umbilical edges rounded; umbilical slopes steep. Shell ornamented by numerous fine spiral lines. No axial lines discernible.

Geological Horizons and Localities.—Arenaceous Purple Shales of the Bog Mine Outliers, Shelve, and the Bank Outlier near Minsterley; Mudstone Phase of the Pentamerus Beds of Morrell's Wood near Leighton; Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier; Pentamerus Beds of Norbury, Hope Quarry, and at the back of a derelict stone building on the east of Josey's Wood Brook 180 yards east of where this stream joins the Hope Valley Brook near Minsterley.

Material.—Twenty-three internal casts (including sixteen from the Bog Mine Outliers) and ten external moulds.

Remarks.—In January 1839 Sowerby erected *Bellerophon trilobatus* to include certain Felindre (Radnor) gastropods. In February 1839 Conrad published a description of *Planorbis trilobatus* from the U.S.A. Subsequently much confusion has arisen concerning the relationships of these two forms and unfortunately the type-specimens are internal casts.

When Reed (1921, p. 29) discussed the species, all the available specimens at his disposal were internal casts. Since the state of preservation did not prove the presence or absence of a slit-band, and no slit-band was yet definitely proved to exist in the British Silurian species, Reed referred the specimens to *Bucaniella* (proposed by Meek (1870, p. 426) for broad-backed trilobed Silurian species of *Bellerophon* without a slit-band) instead of to *Plectonotus* (proposed by Clarke (1900, p. 40) for similar species with a slit-band).

The American species *Bucaniella trilobata* (Conrad)

is not necessarily similar to Sowerby's British species. The best specimens of Conrad's species appear to be those examined from the Silurian rocks of Maryland by Swartz and Prouty (1923, p. 482, pl. xxix. figs. 1-6), who report that numerous fine spiral lines are crossed by finer and more closely set axial lines. Their direction is not stated, although there is a large scale figure of a part of the ornamentation showing axial lines perpendicular to spiral lines (*op. cit.* pl. xxix. fig. 6). The figure (*op. cit.* pl. xxix. fig. 1) showing a specimen with spiral lines (but without axial lines) closely resembles some Marshbrook external moulds (Pl. VII. fig. 1; GSM: 56907). Judging from the reference of this species to *Bucaniella* there is presumably no slit-band. Ulrich and Scofield (1897, p. 848) in a footnote mention the presence of fine spiral lines on testiferous specimens of *B. trilobata* (Conrad), and say that the axial lines are faint and form a broad sinus on the median lobe but there is no slit-band. Conrad's species is thus apparently characterized by spiral lines being much stronger than axial lines, and the latter may even be absent; it is to be referred to *Bucaniella*.

The best specimens of Sowerby's species seem to be those described by McLearn (1924, p. 140, pl. xx. figs. 18, 30-2) from the Silurian rocks of Arisaig, Nova Scotia, and show both spiral and axial lines. Axial lines are said to be sharply deflected backward to meet the band at about 50° to 60°, and are transverse and deeply concave on the band. McLearn mentions the presence of "obscure fine revolving striæ." His description and figure (*op. cit.* pl. xx. fig. 32) give an impression that the axial lines are more distinct than the spiral lines. Straw (1933, p. 125) refers to the presence of axial lines on a specimen of *Plectonotus trilobatus* (GSM: 51861) obtained from the deep boring made through Palæozoic rocks near Little Missenden, Bucks., but spiral lines are not discernible. In contradistinction with Conrad's species the species erected by Sowerby apparently shows well-developed axial lines while spiral lines may be faint or absent; although McLearn and Straw place the above-mentioned specimens in *Plectonotus* they make no reference to a slit-band.

Only spiral lines and not axial lines are discernible in the Shropshire specimens, which agree in this respect with the material examined by Swartz and Prouty. Since no slit-band is yet definitely proved to exist in the Shropshire specimens they are referred to *Bucaniella*.

Group II. *FISSIDORSATA* Reed, 1921.

Genus *BELLEROPHON* Montfort, 1808.

Bellerophon sp. (Pl. VII. figs. 5-7.)

Shell subglobose, involute, body-whorl nearly completely envelops inner whorls and increases slowly in breadth to the aperture. Whorls are higher than wide in transverse section, with a rounded periphery. Umbilicus narrow and deep; umbilical edges rounded; umbilical slope very steep. Slit-band narrow, bounded by a keel on each side and slightly elevated behind the aperture. Axial lines curve back to meet the slit-band at about 45° , indistinct on the earlier part of the body-whorl, becoming coarse near the aperture, where they project as lamellæ on the umbilical edges. Sometimes they unite in pairs to form single axial lines or divide, while curving to meet the slit-band behind the aperture. There is a transverse constriction following the direction of axial lines behind the aperture.

Geological Horizon and Locality.—Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier.

Material.—One external mould (GSM: 56909 & 56910).

Remarks.—The aperture is not entire (Pl. VII. figs. 5 & 6), so it is not known whether the outer lip is bent outwards. The specimen resembles *Bellerophon squamosus* (Lindström, 1884, p. 78, pl. v. figs. 17-24), but may be distinguished by the axial lines meeting the slit-band at 45° instead of 58° , the absence of spiral lines, and the presence of a transverse constriction behind the aperture. The species appears to be allied to *Bellerophon wenlockensis* Sowerby (Reed, 1921, p. 56, pl. ix. fig. 16), but the body-whorl is less, instead of being more, than twice as high as wide in transverse section, the axial lines meet the slit-band at a more acute angle, the slit-band is a little wider, and the transverse constriction is present instead of being absent. Only one specimen is available, and I

am not confident that it is a valid species, and thus have not proposed a new name.

Genus BUCANIOPSIS Ulrich, 1897.

Bucaniopsis carinatus (J. de C. Sowerby)

var. *reedi*, nov. (Pl. VII. figs. 8-13.)

1866. *Bellerophon carinatus* Salter, p. 363.

1878. *Bellerophon carinatus* Etheridge and Newton, p. 78.

1881. *Bellerophon carinatus* Salter, pp. 437 & 446.

1921. *Cymbularia carinata* (Sow.) var. *Reed*, p. 66, pl. x. figs. 13 & 14.

Shell involute, composed of about four whorls which are compressed and subtriangular in section, with gently convex sides and subangular periphery. Umbilicus open and deep, usually less than a quarter of the breadth of the shell in diameter, with subangular umbilical edges partly exposing inner whorls; umbilical slope steep. Outer lip increasing somewhat rapidly in breadth to the aperture, with a V-shaped slit in the outer lip (sometimes followed by a long narrow median slit extending about halfway along the body-whorl). Upper and lower angles of the aperture expanded. Slit-band narrow, plane, and bounded by a keel on each side. Surface of shell ornamented by numerous spiral lines. Axial lines distinctly shown behind the aperture, probably parallel to the lips, indistinctly or hardly seen on the body-whorl farther away from the aperture, radial on the umbilical edges, and curving back to the band.

Geological Horizon and Locality.—Arenaceous Purple Shales of the Bog Mine Outliers, Shelve.

Material.—Five external moulds and thirteen internal casts.

Holotype.—GSM: 56911.

Paratypes.—GSM: 28062, 28065, 36062 C, & 56912-56915.

Remarks.—When Reed (1921, p. 66, pl. x. figs. 13 & 14) described the variety he had only internal casts available for description. Since then external moulds have been collected from the Bog Mine Outliers and show the ornamentation and the slit-band. According to Reed the variety is more swollen and less compressed than *Cymbularia carinata* (Sowerby) (Reed, 1921, p. 64, pl. x. fig. 12). The holotype of *C. carinata* is an internal cast and so its generic position is rather doubtful.

Genus TEMNODISCUS Koken, 1896.

Temnodiscus cf. *nitidulus* (Ulrich).

(Pl. VII. figs. 14-16.)

1897. *Cyrtolitina nitidula* Ulrich, p. 866, pl. lxii. figs. 53-5.

Shell compressed, composed of about two whorls increasing rapidly in size towards the aperture. Whorls subtriangular in section, with a blunt periphery, gently convex sides behind the aperture, and more flattened sides farther away. Umbilicus open and deep, about a quarter of the breadth of shell, with rounded umbilical edges, exposing inner whorls. Aperture about as wide as high, with a V-shaped sinus in the outer lip and gently rounded upper and lower lobes. Slit-band slightly grooved, with indistinct elevated margins behind the aperture, and crossed by strongly arched lunulæ. Axial lines sublamellose and curving back to meet the slit-band at a very acute angle (about 15°). Spiral lines weaker than axial lines discernible on the earlier part of the body-whorl.

Geological Horizon and Locality.—Pentamerus Beds of the Marshbrook Faulted Outlier.

Material.—One specimen from the Mudstone Phase and one external mould from the Arenaceous Phase of the Pentamerus Beds.

Remarks.—The species resembles *Cyrtolitina nitidula* (Ulrich and Scofield, 1897, p. 866, pl. lxii. figs. 53-5) from the Trenton Formation, but the sinus in the outer lip is slightly more deep and the axial lines curve back to meet the slit-band at a more acute angle. I do not feel confident that on these slight differences alone it would be possible to separate the Shropshire form from that found in the Trenton Formation, and so I do not propose to erect a new variety or species.

Subgroup II A. *TEREBRIDORSATA* Reed, 1921.

Genus TREMATONOTUS Hall, 1868.

Trematonotus sp. (Pl. VII. fig. 17.)

1865. *Bellerophon dilatatus* Huxley and Etheridge, p. 37.

1866. *Bellerophon dilatatus* [sic] Salter, p. 363.

1869. *Bellerophon dilatatus* Morton, p. 21.

1878. *Bellerophon dilatatus* Etheridge and Newton, p. 78.

The specimen (Pl. VII. fig. 17 ; GSM : 28060) is partly an external mould and partly an internal cast. It

resembles *Trematonotus longitudinalis* (Lindström, 1884, p. 86, pl. iii. figs. 39, & 40, pl. iv. figs. 1-7) and agrees nearly with one of Lindström's figures (*op. cit.* pl. iv. fig. 4), but the axial ridges are stronger than the spiral lines on the later part of the penultimate whorl, whereas in Lindström's figure the reverse is the case. The umbilicus occupies about a quarter of the breadth of the shell and overlaps more than in Lindström's species. The ornament is not preserved on the earlier whorls of the Shropshire specimen, while Lindström's figure shows the axial ridges to be indistinct or absent on the inner whorls, where the spiral lines are distinct.

Geological Horizon and Locality.—Arenaceous Purple Shales of Bog Mine Outliers, Shelve.

Material.—One specimen (GSM : 28060).

Remarks.—There is some doubt whether *T. longitudinalis* is identical with *T. dilatatus* (J. de C. Sowerby). A synonymy and description of *T. dilatatus* is given by Reed (1921, pp. 80-3, pl. xiii. fig. 1).

INCERTÆ SEDIS.

Genus *PTEROTHECA* Salter, 1852.

Pterotheca avirostris, sp. n. (ex Salter MS.).

(Pl. VII. figs. 18-19.)

1865. *Pterotheca (avirostris)* Huxley and Etheridge, p. 37.

1868. *Pterotheca avirostris* Salter, Bigsby, p. 148.

1869. *Pterotheca avirostris* Salter, Morton, p. 21.

1878. *Pterotheca avirostris* MS., Etheridge and Newton, p. 78.

1888. *Pterotheca avirostris* Salter, Etheridge, p. 118.

1908 a. *Pterotheca avirostris* Reed and Reynolds, p. 33.

1908 b. *Pterotheca avirostris* Salter MS., Reed and Reynolds, p. 540.

1911. *Pterotheca avirostris* Salter (MS.), Reed, pp. 215 & 218.

Internal cast nearly patelliform, obscurely polygonal in outline, with a gently convex surface, the curvature of the shell not amounting to a single whorl. Apical angle is about 60°. Apical region lies upon the inner lip, over the edge of which it plunges into the matrix; the apical region is triangular in transverse section. A median angulated keel runs along the upper side of the shell from the apex to the edge of the outer lip. Two feeble lateral undulations on each side of this keel diverge from the apex towards the margin of the outer lip, becoming slightly stronger on reaching the outer lip though still feeble. A shallow groove occurs on the inner

lip beneath the apical region and passes to the edge of the inner lip (GSM: 56918).

Geological Horizons and Localities.—Arenaceous Purple Shales of the Bog Mine Outliers, Shelve, and the Bank Outlier near Minsterley and the Upper Valentian of Damery Bridge, Tortworth.

Material.—Five internal casts (two from the Bog Mine Outliers, one from the Bank Outlier, and two from Tortworth). The specimens GSM: 23112 from the Bog Mine Outliers and GSM: 23113 & 23114 from Tortworth are the ones used by Salter for his manuscript name.

Holotype.—GSM: 23112.

Paratypes.—GSM: 23114 & 56918.

Remarks.—The outline is best seen in the paratype (Pl. VII. fig. 19; GSM: 23114), where, however, it does not appear to be entire. The inner lip gives the impression of an approximate semi-octagon.

IV. CONCLUSIONS.

An analysis of the faunal list (pp. 83 & 84) shows that *Phanerotrema jugosum*, *Globispira acuta*, *Trochonema valenticum*, *Eunema* (?) *multicarinatum*, *Fusispira acuminata*, *Pagodea* (?) *valentica*, *Platyceras prototypum*, *Temnodiscus* cf. *nitidulus*, and most of the representatives of *Liospira*, *Lophospira*, and *Gyronema* are confined to the Pentamerus Beds; *Ulrichospira similis*, *Euomphalopterus apedalensis*, *Eunema* (?) *convexum*, *Sinuities subquadratus*, *Bucaniopsis carinatus* var. *reedi*, *Trematonotus* sp., and *Pterotheca avirostris* are only known from the Purple Shales; the remaining forms have been found in both divisions of the Upper Valentian of Shropshire.

None of the Bohemian species described and figured in great detail by Perner (1903, 1907, and 1911) has been found in the Shropshire rocks. On the other hand, *Gyronema octavium*, *Gyronema octavium* var. *multicarinata*, *Platyceras cornutum*, *Platyceras prototypum*, and *Bucaniella trilobata* have been recorded from Gotland; furthermore, some of the fragmentary and undescribed specimens in my collection which are to be included in the suborder Bellerophontacea also resemble some Gotlandian species. *Bucaniella trilobata* and *Temnodiscus* cf. *nitidulus* are recorded from the U.S.A.

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VI. EXPLANATION OF THE PLATES.

PLATE I.

- Fig. 1.* *Liospira lenticularis* (J. de C. Sowerby) (see p. 84). Holotype (GSM: 6870). Upper view, $\times 1$. Upper Valentinian of Sturedge Hill, Worcester.

Figs. 2-5. *Liospira uriconiensis*, sp. n. (see p. 86).

- Figs. 2.* Syntype (GSM: 56828). Upper view, $\times 1$. Pentamerus Beds of brook, Morrell's Wood, near Leighton, 140 yds. W. of Morrell's Wood Farm.

- Fig. 3.* Same specimen. View of base, $\times 1$.

- Fig. 4.* Same specimen. Back view, $\times 1$.

- Fig. 5.* Syntype (GSM: 56829). Back view, showing the band on the periphery, $\times 1.1$. Pentamerus Beds of brook, Morrell's Wood, near Leighton, 200 yds. W. of Morrell's Wood Farm.

Figs. 6-10. *Liospira cornovica*, sp. n. (see p. 87).

- Fig. 6.* Revertex cast of the external mould *, syntype (GSM: 56834). Upper view, $\times 2$. Pentamerus Beds at the back of a derelict stone building on the east of Josey's Wood Brook 180 yds. E. of where this stream joins the Hope Valley Brook near Minsterley.

- Fig. 7.* Internal cast of syntype (GSM: 56837). Upper view, $\times 2$. Pentamerus Beds of Hope Quarry, near Minsterley.

- Fig. 8.* Same specimen. Apertural view, $\times 2$.

- Fig. 9.* Same specimen. Back view, $\times 2$.

- Fig. 10.* Revertex cast of the internal mould, syntype (GSM: 56838). View of base, $\times 2$. Arenaceous Purple Shales, Bog Mine Outlier, $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, Shelve.

- Fig. 11.* *Lophospira trilineata*, sp. n. (see p. 89). Revertex cast of the external mould, holotype (GSM: 56846). Side view, $\times 2$. Pentamerus Beds of the small faulted outcrop south-west of Lower Wood Farm between Betton and Wilmington.

PLATE II.

Figs. 1-4. *Lophospira woodlandi* Longstaff (see p. 88).

- Fig. 1.* Specimen (GSM: 56839). Back view, $\times 1$. Pentamerus Beds of brook, Morrell's Wood, near Leighton, 140 yds. W. of Morrell's Wood Farm.

- Fig. 2.* Same specimen. Apertural view, showing the callus covering the umbilicus, $\times 1$.

- Fig. 3.* Specimen (GSM: 56842). Back view, showing the uppermost spiral ridge (*s.r.*) just below the suture on the body-whorl, $\times 1$. Pentamerus Beds of brook, Morrell's Wood, near Leighton, 120 yds. W. of Morrell's Wood Farm.

- Fig. 4.* Specimen (GSM: 56844). View of base, $\times 1$. Pentamerus Beds of brook, Morrell's Wood, near Leighton, 180 yds. W. of Morrell's Wood Farm.

Figs. 5-7. *Lophospira* (?) *angulata*, sp. n. (see p. 90).

- Fig. 5.* Revertex cast of the external mould, holotype (GSM: 56849). Back view, $\times 2.9$. Pentamerus Beds at the back of a derelict

* Since revertex casts sometimes shrunk a little before the final photograph was obtained, all magnifications refer to actual specimens and not to artificial casts.

stone building on the east of Josey's Wood Brook 180 yds. E. of where this stream joins the Hope Valley Brook near Minsterley.

Fig. 6. Holotype (GSM: 56851). Side view, $\times 4$. Same locality and horizon as previous figure.

Fig. 7. Same specimen. View of base, $\times 2.9$.

Figs. 8–9. *Lophospira* sp. ind. (see p. 91).

Fig. 8. Specimen (BM: G 4482). Back view, $\times 1$. Pentamerus Beds of Minsterley (Hope?).

Fig. 9. Same specimen. View of base, $\times 1$.

Figs. 10–11. *Lophospira* sp. (see p. 92).

Fig. 10. Specimen (BM: G 4471). Back view, $\times 1$. Arenaceous Purple Shales of the Bank Outlier near Minsterley.

Fig. 11. Same specimen. View of base, $\times 1$.

PLATE III.

Figs. 1–8. *Stenoloron aequilaterum* (Wahlenburg)
var. *shelvensis*, nov. (see p. 93).

Fig. 1. Revertex cast of the external mould, holotype (GSM: 36023 A). Upper view, $\times 1$. Arenaceous Purple Shales, Bog Mine Outliers, Shelve.

Fig. 2. Revertex cast of the external mould, paratype (GSM: 56853 B & 56854 B). Back view, $\times 1$. Arenaceous Purple Shales, Bog Mine Outlier, $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, near Shelve.

Fig. 3. Revertex cast of the external mould, paratype (BM: G 12564). Oblique upper view, showing the band, $\times 1.5$. Same locality and horizon as fig. 1.

Fig. 4. Internal cast of paratype (GSM: 36020). Upper view, $\times 1$. Same locality and horizon as previous specimen.

Fig. 5. Same specimen. Back view, $\times 1$.

Fig. 6. Internal cast of paratype (GSM: 56859). View of base, $\times 1$. Arenaceous Purple Shales, Bog Mine Outlier, $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, Shelve.

Fig. 7. Internal cast of paratype (GSM: 56857). Upper view, $\times 1$. Same locality and horizon as previous specimen.

Fig. 8. Internal cast of paratype (GSM: 56855). Side view, $\times 1$. Same locality and horizon as previous specimen.

Figs. 9–14. *Phanerotrema jugosum*, sp. n. (ex Salter MS.) (see p. 95).

Fig. 9. Revertex cast of the external mould, holotype (GSM: 56860). Apertural view, $\times 1.1$. Arenaceous Pentamerus Beds of Old Quarry 100 yds. S. of Squire Hall and $\frac{3}{4}$ mile W. of Norbury.

Fig. 10. Same specimen. Oblique view of base, showing the callus, $\times 1.1$.

Fig. 11. Same specimen. Upper view, $\times 1$.

Fig. 12. Revertex cast of the external mould, paratype (GSM: 36013). Back view, $\times 1$. Pentamerus Beds of Norbury.

Fig. 13. Revertex cast of the external mould, paratype (GSM: 56862). Oblique upper view, $\times 0.9$. Arenaceous Pentamerus Beds, tip-heap, 150 yds. S. of Brow Farm S.E. of Norbury.

Fig. 14. Internal cast of paratype (GSM: 56863). Back view, $\times 1$. Same locality and horizon as fig. 9.

Fig. 15. *Ulrichospira similis* Donald (see p. 97). Specimen (GSM: 56864). Side view, $\times 1.8$. Purple Shales of Gippol's Dingle.

1 mile N. 30° E. of Hughley $\frac{1}{2}$ mile from its junction with Hughley Brook.

- Fig. 16.* *Globispira acuta*, sp. n. (see p. 97). Revertex cast of the external mould, holotype (GSM: 56866). Back view, $\times 2.2$. Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier at exposure 150 yds. S.W. of New House

PLATE IV.

Figs. 1-3. *Euomphalopterus apedalsensis*, sp. n. (see p. 98).

- Fig. 1.* Holotype (GSM: 56867). Upper view, $\times 4$. Limestone band in the Purple Shales of Harley Brook $\frac{1}{2}$ mile S. of Harley.
Fig. 2. Same specimen. View of base, $\times 4.3$.
Fig. 3. Same specimen. Back view, $\times 4.1$.

Figs. 4-9. *Trochonema valenticum*, sp. n. (see p. 100).

- Fig. 4.* Holotype (GSM: 56869). Upper view, $\times 1.9$. Pentamerus Beds of Morrell's Wood, near Leighton.
Fig. 5. Same specimen. Back view, $\times 2$.
Fig. 6. Same specimen. View of base, $\times 2.9$.
Fig. 7. Paratype (GSM: D 3431). Back view, $\times 2$. Same locality and horizon as previous specimen.
Fig. 8. Same specimen. View of base, $\times 2.9$.
Fig. 9. Internal cast of paratype (GSM: 56870). Back view, $\times 2.1$. Pentamerus Beds at section by Ford, Morrell's Wood, near Leighton, 170 yds. W. of Morrell's Wood Farm.

Figs. 10-14. *Eunema salopiense*, sp. n. (see p. 101).

- Fig. 10.* Revertex cast of the external mould, syntype (GSM: 56873 & 56874). Back view, $\times 1$. Arenaceous Purple Shales, Bog Mine Outlier, $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, Shelve.
Fig. 11. Revertex cast of the external mould, syntype (GSM: 56876 A). Back view, $\times 0.9$. Arenaceous Purple Shales, Bog Mine Outlier, Shelve.
Fig. 12. Revertex cast of the external mould, syntype (GSM: 36062 A). Compare the distance between the band and the lower suture in the penultimate whorl in this and fig. 13. Side view, showing the growth-lines behind the aperture curving backwards and upwards to the upper carina of the peripheral band, $\times 0.9$. Same locality and horizon as the previous specimen.
Fig. 13. Revertex cast of the external mould, syntype (GSM: 56853 A). Apertural view, showing the lower limit of the band coincident with the lower suture, $\times 1$. Arenaceous Purple Shales, Bog Mine Outlier, $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, Shelve.
Fig. 14. Internal cast of syntype (GSM: 56858). Back view, $\times 1$. Same locality and horizon as previous specimen.
Fig. 15. *Eunema* (?) *multicarinatum*, sp. n. (see p. 103). Revertex cast of the external mould, holotype (GSM: 56877). Back view, $\times 2$. Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier at exposure 150 yds. S.W. of New House.

Figs. 16-17. *Eunema* (?) *convexum*, sp. n. (see p. 104).

- Fig. 16.* Revertex cast of the external mould, holotype (BM: G 12570). Back view, $\times 1$. Arenaceous Purple Shales, Bog Mine Outlier, Shelve.
Fig. 17. Same specimen. View of base, $\times 1$.

PLATE V.

Figs. 1-3. *Gyronema octavium* (d'Orbigny) var. *multicarinata* (Lindström) (see p. 106).

Fig. 1. Specimen (GSM: 56878). Back view, $\times 1$. Pentamerus Beds of brook, Morrell's Wood, near Leighton, 140 yds. W. of Morrell's Wood Farm.

Fig. 2. Specimen (GSM: 56880). View of base, $\times 2.1$. Pentamerus Beds of brook, Morrell's Wood, near Leighton, 230 yds. W. of Morrell's Wood Farm.

Fig. 3. Specimen (GSM: 56881). Side view, showing the axial lines, $\times 4.1$. Mudstone Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier at section of the western tributary of Minton Batch, 250 yds. W. 30° S. of New House.

Figs. 4-7. *Gyronema octavium* (d'Orbigny) var. *minutum*, nov. (see p. 107). All revertex casts of external moulds. Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier at exposure 150 yds. S.W. of New House.

Fig. 4. Holotype (GSM: 56882). Back view, $\times 4.1$.

Fig. 5. Same specimen. View of base, $\times 3.9$.

Fig. 6. Paratype (GSM: 56884). Back view, $\times 4.1$.

Fig. 7. Paratype (GSM: 56883). Back view, $\times 4$.

Figs. 8-10. *Cyclonema crebristria* (McCoy) var. *rugatum*, nov. (see p. 107).

Fig. 8. Holotype (GSM: 56888). Back view, $\times 1$. Pentamerus Beds, tip-heap, 150 yds. S. of Brow Farm S.E. of Norbury.

Fig. 9. Same specimen. View of base, $\times 1$.

Fig. 10. Revertex cast of the external mould, paratype (GSM: 56892). Back view, $\times 0.9$. Arenaceous Purple Shales, Bog Mine Outlier, $\frac{1}{2}$ mile N. 45° E. of Ritton Castle, Shelve.

Figs. 11-14. *Anomphalus* sp. ind. (see p. 109).

Fig. 11. Internal cast (GSM: 56893). Upper view, $\times 1.9$. Arenaceous Purple Shales, Bog Mine Outlier, $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, Shelve.

Fig. 12. Same specimen. View of base, $\times 2$.

Fig. 13. Same specimen. Apertural view, $\times 1.9$.

Fig. 14. Internal cast (GSM: 56894). View of base, showing growth-(?) lines on a fragment of the text, $\times 4$. Arenaceous Purple Shales of the Bank Outlier near Minsterley.

Figs. 15-19. *Holopella* (?) *cancellata* (J. de C. Sowerby) (see p. 110).

Fig. 15. Holotype (GSM: 6886). Back view, $\times 1$. Upper (?) Valentian of Mandinam, Llandovery.

Fig. 16. Specimen (GSM: 56895). Back view, $\times 2$. Arenaceous Purple Shales of the Bank Outlier near Minsterley.

Fig. 17. Specimen (GSM: 56896). Young individual. Back view, $\times 4.6$. Same locality and horizon as previous specimen.

Fig. 18. Revertex cast of the external mould (GSM: 56897). Old individual. Compare the curvature of the axial lines in this and fig. 16. Apertural view, $\times 2$. Pentamerus Beds of Hope Quarry, near Minsterley.

Fig. 19. Revertex cast of the external mould (GSM: 56898). Back view, showing the third, fourth, and fifth spiral keels closer together than the others, $\times 1$. Pentamerus Beds of Hope Valley Brook, near Hope Quarry, Minsterley.

PLATE VI.

Figs. 1-4. *Holopella* (?) *cancellata* (J. de C. Sowerby) (see p. 110).

Fig. 1. Oblique longitudinal section of specimen (GSM: 56899). showing the two layers of test, $\times 3.9$. Pentamerus Beds

at the back of a derelict stone building on the east of Josey's Wood Brook 180 yds. E. of where this stream joins the Hope Valley Brook near Minsterley.

Fig. 2. Longitudinal section of specimen (GSM: 56900), showing the inclination of the columella, $\times 1.5$. Pentamerus Beds of Hope Quarry, near Minsterley.

Fig. 3. Specimen (GSM: 36049). Back view, $\times 1$. Upper Valentian of Gunwick Mill, near Alfrick, Worcestershire.

Fig. 4. Specimen (BM: G 43211). Back view, $\times 1$. Pentamerus Beds of Hope, Minsterley.

Fig. 5. *Holopella gracilior* McCoy (see p. 112). Internal cast of the holotype (SM: A 6379). Genotype of *Holopella*. Back view, $\times 2$. Ludlow Rocks of Dinas Bran, Llangollen, Denbighshire.

Figs. 6-7. *Fusispira acuminata*, sp. n. (see p. 112).

Fig. 6. Internal cast of the holotype (GSM: 56901). Apertural view, $\times 1$. Pentamerus Beds of Morrell's Wood Brook, near Leighton, 120 yds. W. of Morrell's Wood Farm.

Fig. 7. Internal cast of the paratype (GSM: 56902). Side view, $\times 1$. Pentamerus Beds at section, 10 yds. S. of Morrell's Wood Brook, near Leighton, 110 yds. W. of Morrell's Wood Farm.

Figs. 8-10. *Pagodea (?) valentica*, sp. n. (see p. 113).

Fig. 8. Revertex cast of the external mould, holotype (GSM: 56903). Side view, $\times 1$. Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier at exposure 150 yds. S.W. of New House.

Fig. 9. Same specimen. Upper view, $\times 1.4$.

Fig. 10. Revertex cast of the external mould, paratype (GSM: 56904). View of base, $\times 1.4$. Same locality and horizon as previous specimen.

Fig. 11. *Platyceras prototypum* (Phillips) (see p. 115). Holotype (GSM: GS b 4394). Back view, $\times 1$. Woolhope Limestone. Presteign, Radnorshire.

Figs. 12-14. *Sinuities subquadratus*, sp. n. (see p. 116).

Fig. 12. Holotype (GSM: 56905). Upper view, $\times 2$. Limestone band in the Purple Shales of Harley Brook $\frac{1}{2}$ mile S. of Harley.

Fig. 13. Same specimen. Apertural view, $\times 2$.

Fig. 14. Paratype (GSM: 56906). Apertural view, showing growth-lines on the periphery, $\times 3.9$. Same locality and horizon as previous specimen.

PLATE VII.

Figs. 1-4. *Bucaniella trilobata* (Conrad) (see p. 117).

Fig. 1. Revertex cast of the external mould (GSM: 56907). Back view, $\times 3.6$. Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier at exposure 150 yds. S.W. of New House.

Fig. 2. Same specimen. Lower view, $\times 3.9$.

Fig. 3. Internal cast (GSM: 28139). Back view, $\times 2.1$. Arenaceous Purple Shales. Bog Mine Outlier, Shelve.

Fig. 4. Internal cast (GSM: 56908). Lower view, $\times 2$. Arenaceous Purple Shales, Bog Mine Outlier, $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, Shelve.

Figs. 5-7. *Bellerophon* sp. (see p. 120).

Fig. 5. Revertex cast of the external mould (GSM: 56909 & 56910). Lower view, $\times 0.9$. Arenaceous Phase of the Pentamerus

Beds of the Marshbrook Faulted Outlier at exposure 150 yds. S.W. of New House.

Fig. 6. Same specimen. Side view, $\times 0.8$.

Fig. 7. Same specimen. Back view, $\times 0.9$.

Figs. 8-13. *Bucaniopsis carinatus* (J. de C. Sowerby) var. *reedi*, nov. (see p. 121).

Fig. 8. Revertex cast of the external mould, holotype (GSM: 56911). Lower view, $\times 1$. Arenaceous Purple Shales, Bog Mine Outlier, $\frac{1}{2}$ mile N. 40° E. of Ritton Castle, Shelve.

Fig. 9. Same specimen. Back view, $\times 1$.

Fig. 10. Revertex cast of the external mould, paratype (GSM: 56912). Lower view, $\times 1.1$. Same locality and horizon as previous specimen.

Fig. 11. Internal cast of paratype (GSM: 28065). Upper view, $\times 1$. Arenaceous Purple Shales, Bog Mine Outlier, Shelve.

Fig. 12. Internal cast of paratype (GSM: 28062). Back view, $\times 1$. It is in a different position from Reed's figure (1921, pl. x. fig. 14). Same locality and horizon as previous specimen.

Fig. 13. Internal cast of paratype (GSM: 56914). Back view, showing the cast of the long slit, $\times 1$. Same locality and horizon as fig. 8.

Figs. 14-16. *Temnodiscus* cf. *nitidulus* (Ulrich) (see p. 122).

Fig. 14. Specimen (GSM: 56917). Lower view, $\times 2$. Mudstone Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier at section of the western tributary of Minton Batch, 250 yds. W. 30° S. of New House.

Fig. 15. Same specimen. Back view, $\times 2$.

Fig. 16. Revertex cast of the external mould (GSM: 56916). Side view, $\times 3.6$. Arenaceous Phase of the Pentamerus Beds of the Marshbrook Faulted Outlier at exposure 150 yds S.W. of New House.

Fig. 17. *Trematonotus* sp. (see p. 122). Revertex cast of the external mould (GSM: 28060). Lower view, $\times 1$. Arenaceous Purple Shales, Bog Mine Outlier, Shelve.

Figs. 18-19. *Pterotheca avirostris*, sp. n. (ex Salter MS.) (see p. 123).

Fig. 18. Internal cast of the holotype (GSM: 23112). Upper view, $\times 1$. Same locality and horizon as previous figure.

Fig. 19. Internal cast of paratype (GSM: 23114). Upper view, $\times 1$. Upper Valentian of Damery Bridge, Tortworth.

VI.—New and less-known *Palæarctic* Tettigoniidæ (Orthoptera). By B. P. UVAROV, D.Sc., British Museum (Natural History).

THE following descriptions and notes are based mostly on specimens in the British Museum, where the types of the new species are preserved.

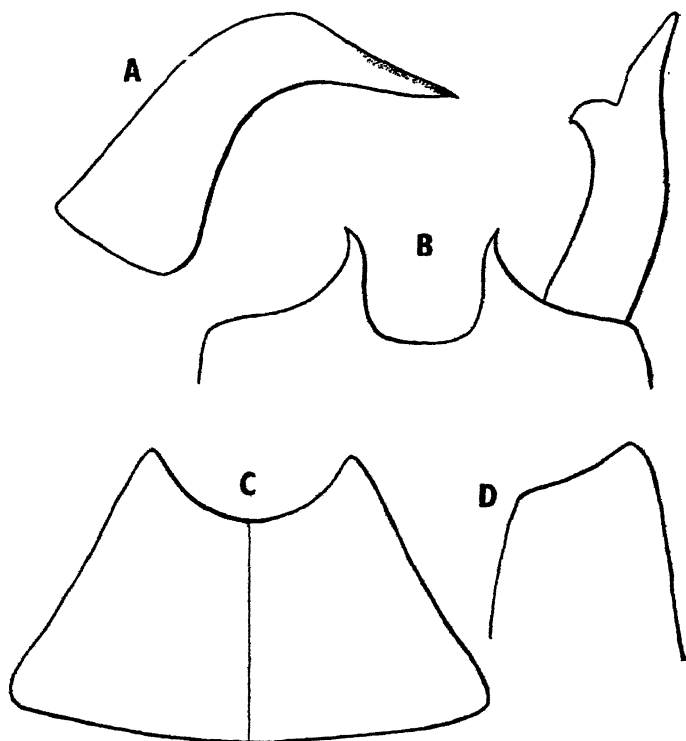
I am grateful to my colleague, Dr. W. Ramme, for his kind assistance in working out two new species from Anatolia, described below.

Pæcilimon angulatus, sp. n. (Fig. 1, A.)

Very similar in general appearance to *P. ampliatus* Br. W. (Serbia), but strongly differing from it in the structure of the male cercus, which is similar to that in *P. macedonicus* Ramme.

♂. Fastigium of vertex narrower than first antennal joint, not sulcate above, obtusely rounded in front.

Fig. 1.



A, right cercus of *Pæcilimon angulatus*, sp. n., ♂; B, apex of abdomen and left cercus of *Anterastes babadaghi*, sp. n., ♂; C, subgenital plate of *Anterastes babadaghi*, sp. n., ♀; D, ditto, side-view.

Pronotum distinctly saddle-shaped, moderately widened and raised behind, with the hind margin very shallowly excised; lateral lobe with the lower margin widely and regularly curved. Elytra two-thirds free. Cercus bent under an almost right-angle just beyond the middle, the apical part weakly sinuate, strongly tapering to a

black point. Subgenital plate large, strongly recurved between the cerci, narrowed to the apex, which is shallowly emarginate.

Coloration brownish buff, with black dots on the head, prozona of pronotum, sides of abdomen and legs; abdomen with a black median fascia; elytra with black radial stripe and brown speculum; hind femur with a black line outside.

♀. Ovipositor shorter than head and pronotum together, with the lower margin practically straight.

Total length, ♂ 17, ♀ 18; pronotum, ♂ 5, ♀ 5.5; elytra, ♂ 2.3; hind femur, ♂ 17.5, ♀ 14; ovipositor, ♀ 6 mm.

Described from 6 ♂♂ (including the type) and 4 ♀♀ taken at Denizli, Mt. Baba-Dagh, 4-5000 ft., 19-20. vi. 1938 (*R. E. Gathorne-Hardy*).

The black pattern as described for the type tends to disappear in some paratypes.

The collection includes a pair of specimens of a *Pœcilimon* taken on 24. vi. 1938 at Mt. Chonas-Dagh, on the other side of Denizli. The male could be taken for *P. angulatus* except that the apex of the cercus is not tapering and ends rather abruptly in a short black spinule. It is not impossible that the same species is represented on the neighbouring mountains by two closely allied subspecies, but the question must remain open until more material is available from the Chonas-Dagh.

Anterastes babadaghi, sp. n. (Fig. 1, B, C, D.)

Very closely allied to *A. serbicus* Br. W., differing from it in the more elongated and excurved appendages of the last tergite in the male, and in the less deeply emarginate subgenital plate and long, straight ovipositor of the female.

♂. Face and sides of the head black. Pronotal disc very light castaneous; lateral lobe black, with the pale marginal fascia very narrow. Pronotum distinctly longer than in *A. serbicus*, with the hind margin broadly rounded, not truncate as in the latter species.

♀. Face not black, but pronotal lobes are, and their pale border is narrow. As in the male, pronotum is longer than in *A. serbicus* and rounded behind.

Total length, ♂ 14, ♀ 18; pronotum, ♂ 5, ♀ 5.5; elytra, ♂ 3, ♀ 0.5; hind femur, ♂ 14.5, ♀ 17; ovipositor, ♀ 16 mm.

Described from one male (type) taken at Denizli, Mt. Baba-Dagh, 4-5000 ft., 19-20. vi. 1938; and a female, Mt. Chonas-Dagh, 3-6000 ft., 24. vi. 1938 (*R. E. Gathorne-Hardy*).

While the characteristic coloration of the head in the male may be not a constant character, there is no reason to doubt that the narrowness of the pale border of pronotal lobes is of significance. In any case, the validity of the new species rests on structural characters, of which the relatively long and rounded behind pronotum differentiates both sexes of *A. babadaghi* from *A. serbicus*, as well as from *A. anaticus* Uvarov (see 'Eos,' x. 1934, p. 57). Moreover, the male has very distinctive long, excurved appendages of the last tergite, while the female subgenital plate is very similar to that in *A. serbicus*, but with a much shallower emargination behind, and very distinct from that in *A. anaticus*, which has a profoundly emarginate plate with the lobes acute and somewhat inflated. The ovipositor of the new species is much longer than in *A. serbicus* and practically straight; ovipositor of *A. anaticus* is intermediate in its relative length and degree of curvature between the other two species.

It appears not improbable that further studies may lead to the conclusion that the three species of *Anterastes* discussed above represent only geographical races (subspecies) of one, but it appears wiser in the meantime to treat them as distinct species.

MIRAMIOLA, gen. nov.

Miram has described in 1927 (C. R. Acad. Sci. U.S.S.R., p. 167) a small Decticinae from S. Russia under the name *Metrioptera pusilla*. Tarbinsky, in 1931 (Bull. Inst. Control. Pests and Diseases, Leningrad, no. 1, p. 159), has pointed out that this species cannot be included into *Metrioptera* because of the lack of the inner pair of spurs on posterior tibiae, and removed it to the genus *Anterastes*. This arrangement, however, is untenable since *pusilla*, while sharing with *Anterastes* the type of tibial armament, is otherwise abundantly distinct from members of the latter genus in characters which are certainly more than merely specific. I have, therefore, to erect a new genus for *pusilla*, which it is a pleasure for me to dedicate to Miss Emilia Miram, who has helped

me in my earliest Orthopterological studies and whose life-long work on Palæarctic Orthoptera is well known to all systematists.

In Caudell's system (Gen. Ins. lxxii. 1908), *Miramiola* should be referred to the group Ctenodectees (more correctly Ctenodectici), composed of three genera, *Ctenodecticus*, *Anterastes*, and *Aprosphyllus*. The last-named one is a very imperfectly-known South African insect, so aberrant in its various characters that its systematic position remains wholly uncertain; in any case, its association with the other two genera rests on purely formal grounds and cannot be regarded as natural. The genus *Ctenodecticus* has abnormally elongate free plantulæ of posterior tarsus, completely rounded pronotum covering elytra, and very peculiar type of genitalia of both sexes. As for *Anterastes*, members of that genus are characterised by the excised subgenital plate of female, by relatively long and very weakly curved ovipositor, by the small cercus armed with a flatly-compressed tooth, and by posterior femora being not less than three times as long as pronotum, with the filiform apical part occupying nearly half of the whole length, and all these characters do not fit *M. pusilla*. The formal diagnosis of the new genus is as follows:—

Size very small for the subfamily. Fastigium of vertex broad. Pronotum weakly rounded above, with a faint median carinula which is more pronounced in the metazona but distinct practically throughout; no trace of lateral carinæ; posterior margin rounded; lateral lobes hanging obliquely. Elytra short, but projecting beyond pronotum in both sexes. Prosternum unarmed. Mesosternal lobes acutely produced. Anterior tibia with an outer apical spine. Posterior femur short, less than three times the length of pronotum, strongly inflated, with the filiform part occupying less than a third of the length. Male cercus straight, with a large preapical tooth. Female subgenital plate triangular, convex, not emarginate apically; ovipositor short, broad, recurved under an obtuse angle near the base.

Genotype: *Metrioptera pusilla* Miram, 1927.

Atlanticus ussuriensis Uvarov, 1926.

This species, described by me (Ann. & Mag. Nat. Hist. ser. 9, xviii. p. 276) as a member of the genus *Atlanticus*,

has been removed by Tarbinsky (Zool. Anz. Bd. xci. 1930, p. 325) to *Paradrymadusa*. To this assignment I am unable to agree, as *A. ussuriensis* agrees in every respect with the characters of *Atlanticus* as given by Rehn and Hebard in their treatment of North American species (Trans. Amer. Ent. Soc. xlii. 1916, pp. 33-100), and differs strikingly from *Paradrymadusa* in the strongly-developed lateral pronotal carinæ of the shape highly typical for *Atlanticus*. The male cercus of *A. ussuriensis*, which is considered by Tarbinsky as typical for a *Paradrymadusa*, is actually very close to that in *A. palpalis* Rehn & Hebard, from China. While the systematics of Decticine genera with very short tarsal plantulæ is far from clear, there is no reason to confuse it still further by changes which lack reasonable foundation.

I am also inclined to question the assignment to the genus *Paradrymadusa* of a Mongolian species, *P. kiritshenkoi*, described by Miram (C. R. Acad. Sci. U.S.S.R. 1929, p. 117), but unable to define its generic position from the description alone.

Glyphonotus sinensis, sp. n. (Fig. 2, S.)

1933. *Glyphonotus thoracicus* Uvarov, Ark. Zool. 26 A, no. 1, p. 1, pl. i. fig. 1 (nec Fischer-Waldheim, 1846!).

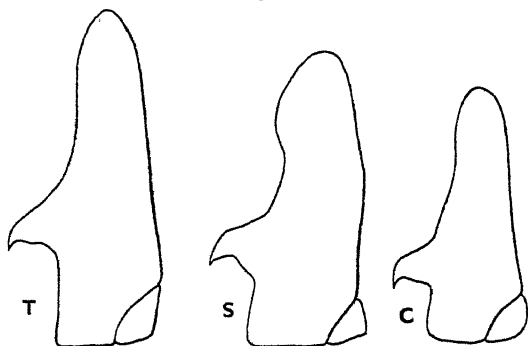
In the paper quoted above, I have recorded a species of *Glyphonotus* from the eastern Tian-Shan under a name which must be revised now in the light of recent observations on that genus by Miram ('Konowia,' xiv. 1935, pp. 256-267), who has given a detailed re-description of *G. thoracicus* F.-W., based on specimens that were practically topotypical. Only one of the specimens recorded by me is before me at present, but its re-examination shows that it is sufficiently distinct from *G. thoracicus* to be regarded as distinct species, with the following diagnosis:—

♂. Size and general habitus as in *G. thoracicus* F.-W., but elytra relatively longer, and pronotum relatively shorter. The main difference is found in the male cercus, which in the new species is considerably shorter than in *G. thoracicus* and expanded on its inner margin before the apex, with the premedian tooth larger and angularly bent (compare figs. 2, T and 2, S). The apical tergite of male in *G. sinensis* is less strongly produced than in *G. thoracicus*. Measurements of the new species can be

found in my 1933 paper, where a photograph of the female is given.

The type is a male from Tian-Shan, Fu-shu-shi, 22. vii. 1928 (*Dr. Hummel*, Sven Hedin's Expedition to Central Asia).

Fig. 2.



Left male cercus of T, *Glyphonotus thoracicus* (F.-W.) ;
S, *G. sinensis*, sp. n. ; and C, *G. coniciplicus* Uv.

Glyphonotus coniciplicus Uvarov, 1914. (Fig. 3, C.)

1914. *Glyphonotus coniciplicus* Uvarov, Rev. Russe d'Ent. xiv. p. 229.

1925. *Glyphonotus uvarovi* Miram, Rev. Russe d'Ent. xix. p. 102, fig. 2.

The above synonymy has already been suggested by Tarbinsky (Bull. Leningrad Inst. Contr. Farm Forest Pests, no. 2, 1932, p. 188), and I am inclined to accept it, although Miram ('Konowia,' xiv. 1935, p. 267) still keeps the two species separate. The type is unfortunately lost. The accompanying figure of male cercus (fig. 3, C) is made from a specimen from River Sary-Su, Syr-Daria Province.

Bradyporus dasypus (Illiger, 1800).

1910. *Bradyporus mocsaryi* Kuthy, Rovart. Lapok, xvii. p. 178 (*syn. nov.*).

Owing to the courtesy of Dr. A. Pongracz, I had the opportunity of examining the type of Kuthy's species and it proved to be a *B. dasypus*. This means that Kuthy's record of his species as being taken in the Caucasus is certainly incorrect, since *B. dasypus* is restricted to the Balkan peninsula and does not occur east of Rumania.

VII.—The Piaget Collection of Mallophaga.—Part VII.

By GORDON B. THOMPSON.

[Continued from Ann. & Mag. Nat. Hist. 1939, ser. 11, vol. iii. p. 421.]

IN the first part of my paper dealing with Piaget's collection (1937, p. 20) I mentioned the fact that a number of Piaget's specimens were to be found in the Leiden Museum. Through the kindness of Dr. H. C. Blöte I am able to present below a list of the species, together with the number of slides and specimens of each. There are altogether 219 species represented by 615 specimens, mounted on 285 slides, besides a few dried specimens mounted on cards regarding which I have no information. It seems also that the greater number of the specimens "mounted" on slides are now in a dry condition.

Species.	No. of specimens in Leiden Mus.	No. of slides.	Hosts.
<i>Gyropus gracilis</i> Nitzsch	4 ♀♀.	1	<i>Cavia cobaya</i> .
<i>G. ovalis</i> Nitzsch	2 ♀♀, 1 ♂.	1	<i>Cavia cobaya</i> .
<i>G. turbinatus</i> Piaget	1 ♀, 1 ♂.	1	"une marmotte."
<i>Menopon albicans</i> Piaget	2 ♀♀.	1	<i>Phasianus pictus</i> .
<i>M. anathorax</i> Nitzsch	1 ♀.	1	<i>Corvus monedula</i> .
<i>M. biserialum</i> Piaget	1 ♀, 1 ♂.	1	<i>Gallophasis cuivieri</i> .
<i>M. brevifimbriatum</i> Piaget	?	1	<i>Procellaria glacialis</i> .
<i>M. brevipalpe</i> Piaget	2 ♀♀.	1	<i>Phalacrocorax carbo</i> .
<i>M. brunneum</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Nucifraga caryocatactes</i> .
<i>M. concretum</i> Piaget	1 ♀.	1	<i>Porphyrio melanopterus</i> (Celebes).
<i>M. crassipes</i> Piaget	3 ♀♀.	1	<i>Epimachus magnificus</i> .
<i>M. crocatum</i> Nitzsch	1 imm.	1	<i>Numenius arquata</i> .
<i>M. dubium</i> Piaget	1 ♀, 1 ♂.	1	<i>Edolius longus</i> (Java).
<i>M. femorale</i> Piaget	3 ♀♀.	1	<i>Platalea leucorodia</i> .
<i>M. flavescens</i> Piaget	2 ♂♂.	1	<i>Sturnus cristatellus</i> .
<i>M. fuscifasciatum</i> var. <i>minor</i> Piaget.	1 ♂.	1	<i>Sterna glacialis</i> .
<i>M. gracile</i> Piaget	2 ♀♀.	1	<i>Porphyrio smaragdinus</i> .
<i>M. grandiceps</i> Piaget	1 ♀, 1 ♂.	1	"Xulla mangola" *.
<i>M. longipalpe</i> Piaget	1 ♀, 1 ♂.	1	<i>Gallophasis melanotus</i> .
<i>M. longitarsus</i> Piaget	2 ♀♀.	1	<i>Halmaturus giganteus</i> .
<i>M. meniscus</i> Piaget	3 ♀♀.	1	<i>Emberiza lapponica</i> .
<i>M. mesoleucum</i> Nitzsch	2 ♀♀.	1	<i>Corvus cornix</i> .
<i>M. obscurum</i> Piaget	2 ♂♂.	1	<i>Anas ratjah</i> .
<i>M. pallascens</i> Nitzsch	4 (? ♀ & ? ♂).	1	<i>Perdix cinerea</i> .
<i>M. pallidum</i> Nitzsch	9 (? ♀ & ? ♂).	3	<i>Gallus furcatus</i> .
			"un coq domestique."
<i>M. phæopus</i> Nitzsch	1 ♀.	1	<i>Larus glaucus</i> .
<i>M. phæosotomum</i> Nitzsch	1 ♂, 2 ♀♀.	2	<i>Pavo specifer</i> (Java).

Species.	No. of specimens in Leiden Mus.	No. of slides.	Hosts.
<i>M. pilosum</i> Piaget	2 ♀♀.	1	<i>Corvus senex.</i>
<i>M. productum</i> Piaget	2 ♀♀.	1	<i>Euplocamus ignitus.</i>
<i>M. productum</i> var. <i>major</i> Piaget.	2 ♀♀, 1 ♂.	1	<i>Lophophorus impeyanus.</i>
<i>M. pustulosum</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Sula alba.</i>
<i>M. spinosum</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Cardinalis virginianus.</i>
<i>M. subæquale</i> Piaget	1 ♀.	1	<i>Euplocamus ignitus.</i>
<i>M. temporale</i> Piaget	1 ♀, 1 ♂.	1	<i>Leptoptilus argala.</i>
<i>M. titan</i> Piaget	1 ♂.	1	<i>Pelecanus oncorolatus.</i>
<i>M. tridens</i> Nitzsch	5 (? ♀ & ? ♂).	2	<i>Fulica atra.</i>
			<i>Gallinula chloropus.</i>
<i>M. trinoton</i> Piaget.	3 (? ♀ & ? ♂).	1	<i>Corvus validissimus.</i>
<i>M. unicolor</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Perdix javanica.</i>
<i>Colpocephalum abdominale</i> Piaget.	1 ♀, 1 ♂.	1	<i>Grus leucauchen</i> (Japan).
<i>C. affine</i> Nitzsch	1 ♀.	1	<i>Totanus ochropus.</i>
<i>C. biserialum</i> Piaget	3 ♀♀.	1	<i>Gracula javanica.</i>
<i>C. caudatum</i> Giebel	2 ♀♀, 1 ♂.	1	<i>Vultur tenuirostris.</i>
<i>C. caudatum</i> var. <i>major</i> Piaget	1 ♀, 1 ♂.	1	<i>Gypogeanus serpentarius.</i>
<i>C. elongatum</i> Piaget	2 ♀♀.	1	<i>Pyrhocorax alpinus.</i>
<i>C. flavescens</i> Nitzsch	2 ♀♀, 1 ♂.	1	<i>Haliaeetus indicus.</i>
			<i>Haliaeetus leucocephalus.</i>
<i>C. heterosoma</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Phaenicopterus antiquorum</i>
<i>C. minus</i> Piaget.	2 ♀♀, 1 ♂.	1	<i>Megapodidium rubripes</i> v. gilberti.
<i>C. ochraceum</i> Nitzsch	1 ♀.	1	<i>Vanellus cristatus.</i>
<i>C. penicillatum</i> Piaget	1 ♀, 2 ♂♂.	1	<i>Ibis cristata.</i>
<i>C. semicinctum</i> Piaget	1 ♀, 1 ♂.	1	<i>Corvus senex.</i>
<i>C. setosum</i> Piaget	1 ♀, 1 ♂.	1	<i>Cathartes gryphus.</i>
<i>C. subæquale</i> Nitzsch	1 ♀.	1	<i>Corvus corax.</i>
<i>C. subpachygaster</i> Piaget	4 ♀♀.	1	<i>Strix noctua.</i>
<i>C. trochioxum</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Ardea stellaris.</i>
<i>C. truncatum</i> Piaget	1 ♂.	1	<i>Phascodomys fossor.</i>
<i>C. uniserialum</i> Piaget	2 ♀♀.	1	<i>Ciconia alba.</i>
<i>Nitzschia pulicaris</i> Nitzsch	1 ♀.	1	<i>Cypselus murarius.</i>
<i>Trinoton conspurcatum</i> Nitzsch	3 ♀♀.	2	<i>Cygnus musicus.</i>
			"une oie domestique."
<i>T. intermedius</i> Piaget	1 ♂.	1	<i>Anas ratjah.</i>
<i>Laemobothrion laticoile</i> Nitzsch	1 ? ♀ or ♂.	1	"un spatule."
<i>Physostomum intermedium</i> Piaget.	1 ♀.	1	<i>Bombycilla garrula.</i>
<i>Trichodectes climax</i> Nitzsch	1 ♀.	1	"un chèvre."
<i>T. climax</i> var. <i>truncata</i> Piaget	6 (? ♀♀ & ? ♂♂).	1	"un chèvre de Java."
<i>T. crenulatus</i> Piaget	1 ♀, 1 ♂.	1	<i>Antelope albifrons.</i>
<i>T. crassus</i> Nitzsch	1 ♀, 1 ♂, 5 imm.	2	<i>Meles vulgaris.</i>
<i>T. dubius</i> Nitzsch	4 (? ♀♀ & ? ♂♂).	1	<i>Mustela vulgaris.</i>
<i>T. exilis</i> Nitzsch	7 (? ♀♀ & ? ♂♂).	1	<i>Lutra vulgaris.</i>
<i>T. latus</i> Nitzsch	1 ♀, 1 ♂.	1	"un chien."
<i>T. parumpilosus</i> Piaget	1 ♀.	1	"un cheval."
<i>T. parumpilosus</i> var. <i>tarsata</i> Piaget	5 ♀♀.	1	"un cheval de Java."
<i>T. penicillatus</i> Piaget	1 ♀, 1 ♂.	1	<i>Macropus penicillatus.</i>
<i>T. sphaerocephalus</i> Olfers	1 ♀, 1 ♂.	1	<i>Ovis ornata.</i>

Species.	No. of specimens in Leiden Mus.	No. of slides.	Hosts.
<i>T. subrostratus</i> Nitzsch	1 ♀, 1 ♂.	1	" un chat."
<i>T. tibialis</i> Piaget	2 ♀♀.	1	<i>Cervus dama</i> .
<i>Goniodes damicornis</i> Giebel	1 ♀, 1 ♂.	1	<i>Tragopan satyrus</i> .
<i>G. colchicus</i> Denny	5 ♀♀.	3	<i>Phasianus colchicus</i> .
			<i>Phasianus nycthemerus</i> .
<i>G. cupido</i> Giebel	2 ♀♀, 1 ♂.	1	<i>Tetrao cupido</i> .
<i>G. dilatatus</i> Rudow	1 ♀, 1 ♂.	1	<i>Tetrao cupido</i> .
<i>G. dispar</i> Nitzsch	1 ♀.	1	<i>Perdix cinerea</i> .
<i>G. dissimilis</i> Nitzsch	1 ♀, 2 ♂♂.	2	<i>Gallus furcatus</i>
			" un coq."
<i>G. elongatus</i> Piaget	1 ♀.	1	<i>Perdix coturnix</i> .
<i>G. falcicornis</i> Nitzsch	2 ♀♀, 2 ♂♂.	2	<i>Pavo cristatus</i> .
<i>G. heteroceros</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Tetrao tetrix</i> .
<i>G. longifasciatus</i> Piaget	1 ♀, 1 ♂.	1	<i>Euplocamus ignitus</i> .
<i>G. longipes</i> Piaget	2 ♀♀.	1	<i>Corax galeatus</i> .
<i>G. minor</i> Piaget	1 ♀, 1 ♂.	1	<i>Turtur risorius</i> .
<i>G. parviceps</i> Piaget	1 ♀, 1 ♂.	1	<i>Pavo cristatus</i> .
<i>G. styliifer</i> Nitzsch	7 (? ♀♀ & ? ♂♂).	2	<i>Meleagris gallopavo</i> .
<i>G. subdilatatus</i> Piaget	3 ♀♀.	2	<i>Tinamus variegatus</i> .
			<i>Tinamus coriis</i> .
<i>G. truncata</i> Piaget	1 ♀.	1	<i>Perdix rubra</i> .
<i>Goniocotes abdominalis</i> Piaget	1 ♀, 1 ♂.	1	<i>Gallus domesticus</i> .
<i>G. chrysocephalus</i> Giebel	1 ♀, 1 ♂.	1	<i>Phasianus sommeringi</i> .
<i>G. compar</i> Nitzsch	8 (? ♀♀ & ? ♂♂).	3	<i>Columba tigrina</i> .
			" un pigeon."
<i>G. fasciatus</i> Piaget	3 ♀♀.	1	<i>Nymphicus nov.-hollandiae</i> .
<i>G. hologaster</i> Nitzsch	5 ♀♀.	1	<i>Gallus bankiva</i> .
<i>G. major</i> Piaget	1 ♀, 1 ♂.	1	<i>Megapodium rubripes</i> v. gilberti.
<i>G. minor</i> Piaget	1 ♀, 1 ♂.	1	<i>Megapodium rubripes</i> v. forsteni.
<i>G. pallidomaculatus</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Perdix javanica</i> .
<i>G. rectangulatus</i> Nitzsch	1 ♀, 2 ♂♂.	1	<i>Pavo spicifer</i> .
<i>Lipeurus angusticeps</i> Piaget	3 ♀♀.	1	<i>Procellaria glacialis</i> .
<i>L. antilogus</i> Nitzsch	3 (? ♀♀ & ? ♂♂).	1	<i>Otis tetraz</i> .
<i>L. appendiculatus</i> Piaget	1 ♀, 1 ♂.	1	<i>Megapodium rubripes</i> v. gilberti.
<i>L. baculus</i> Nitzsch	11 (? ♀♀ & ? ♂♂).	4	<i>Columba migratoria</i> .
			<i>Columba bitorquata</i> .
<i>L. bifasciatus</i> Piaget	2 ♂♂.	1	<i>Pelecanus crispus</i> .
<i>L. docophoroides</i> Piaget	1 ♀, 1 ♂.	1	<i>Ortyx californica</i> .
<i>L. elongatus</i> Piaget	1 ♀, 1 ♂.	1	<i>Spizaetus cirratus</i> .
<i>L. grandis</i> Piaget	2 ♀♀.	1	<i>Thalassidroma pelagica</i> .
<i>L. gyricornis</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Sula australis</i> .
<i>L. heterogrammicus</i> Nitzsch	3 ♀♀.	1	<i>Perdix cinerea</i> .
<i>L. heterographus</i> Nitzsch	2 ♀♀, 2 ♂♂.	2	<i>Gallophaps cirriieri</i> .
			<i>Phasianus pictus</i> .
<i>L. inaequalis</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Megapodium rubripes</i> v. forsteni.
<i>L. intermedius</i> Piaget	1 ♀, 1 ♂.	1	<i>Euplocamus ignitus</i> .
<i>L. interruptofasciatus</i> Piaget	1 ♀, 1 ♂.	1	<i>Eclectus puniceus</i> .

Species.	No. of specimens in Leiden Mus.	No. of slides.	Hosts.
<i>L. lacteus</i> Giebel	1 ♀, 1 ♂.	1	<i>Anas tadorna.</i>
<i>L. leucopygus</i> Nitzsch	4 (? ♀♀ & ? ♂♂).	2	<i>Ardea cinerea.</i>
<i>L. longus</i> Piaget	2 ♀♀.	1	<i>Ardea purpurea.</i>
<i>L. longicornis</i> Piaget	5 (? ♀♀ & ? ♂♂).	2	<i>Tragopan satyrus.</i>
<i>L. maximum</i> Rudow	1 ♂.	1	<i>Sula fusca.</i>
<i>L. mesopelii</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Phalacrocorax carbo.</i>
<i>L. ochraceus</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Grus pavonina.</i>
<i>L. platalearum</i> Giebel	2 ♀♀.	1	<i>Phasianus nycthemerus.</i>
<i>L. polytrapezius</i> Nitzsch	2 ♀♀.	1	<i>Tetrao urogallus.</i>
<i>L. pullatus</i> Nitzsch	5 (? ♀♀ & ? ♂♂).	2	<i>Platalea leucorodia.</i>
<i>L. quadrimaculatus</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Meleagris gallopavo.</i>
<i>L. quadripustulatus</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Sula bassana.</i>
<i>L. raphidius</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Sula alba.</i>
<i>L. secretarius</i> Giebel	1 ♀, 1 ♂.	1	<i>Rhea americana.</i>
<i>L. setosus</i> var. <i>brevisignata</i> Piaget.	2 ♀♀, 1 ♂.	1	<i>Aquila fulva.</i>
<i>L. signatus</i> Piaget	1 ♀, 1 ♂.	1	<i>Ibis cristata.</i>
<i>L. squalidus</i> Nitzsch	2 ♀♀, 1 ♂.	2	<i>Gypogerys serpentarius.</i>
<i>L. subangusticeps</i> Piaget	2 ♀♀.	2	<i>Carbo javanicus.</i>
<i>L. subsetosus</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Anastomus lamelligerus.</i>
<i>L. subsignatus</i> Giebel	2 ♀♀, 1 ♂.	1	"Canard domestique."
<i>L. taurus</i> Nitzsch	2 ♀♀.	1	<i>Thalassidroma leachii.</i>
<i>L. temporalis</i> Nitzsch	1 ♀, 1 ♂.	1	"Ibis."
<i>L. turmalis</i> Nitzsch	2 ♀♀, 1 ♂.	1	<i>Gracula melanotos.</i>
<i>L. unicolor</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Phenicopterus antiquorum</i>
<i>L. variabilis</i> Nitzsch	?	?	"Albatros."
<i>D. auratus</i> Nitzsch	2 ♀♀.	1	<i>Mergus merganser.</i>
<i>D. bassana</i> Denny	2 ♀♀, 1 ♂.	1	<i>Otis tarda.</i>
<i>D. celebrachys</i> Nitzsch	2 ♀♀.	1	<i>Perdix javanica.</i>
<i>D. cephaloxys</i> Nitzsch	3 ♀♀.	2	<i>Gallus furcatus.</i>
<i>D. communis</i> Nitzsch	4 ♀♀.	2	<i>Lophophorus impeyanus.</i>
<i>D. communis</i> var. <i>passeris</i> Piaget.	6 (? ♀♀ & ? ♂♂).	3	<i>Gallophasid cuivieri.</i>
<i>D. communis</i> var. <i>pyrrhulæ</i> Piaget.	2 ♀♀, 1 ♂.	1	"un coq."
<i>D. crassipes</i> Nitzsch	8 (? ♀♀ & ? ♂♂).	3	"un coq de cochon-chine."
<i>D. cursor</i> Nitzsch	2 ♀♀.	1	<i>Corvus frugilegus.</i>
<i>D. cygni</i> Denny	1 ♀.	1	<i>Scolopax rusticola.</i>
<i>D. eurygaster</i> Giebel	2 ♀♀.	1	<i>Sula alba.</i>
<i>D. excisus</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Strix brachyotus.</i>
<i>D. forficula</i> Piaget	2 ♀♀.	1	<i>Alcedo ispida.</i>
<i>D. fulvus</i> Nitzsch	1 ♀, 1 ♂.	1	"un moineau."
	4 (? ♀♀ & ? ♂♂).	2	<i>Fringilla cardueli</i>
			<i>Motacilla alba.</i>
			<i>Silvia turdoides.</i>
			<i>Pyrrhula vulgaris.</i>
			<i>Nucifraga caryocatactes.</i>
			<i>Strix passerina.</i>
			<i>Strix aluco.</i>
			<i>Cygnus musicus.</i>
			<i>Buteo lagopus.</i>
			<i>Hirundo urtica.</i>
			<i>Platycercus eximius.</i>
			<i>Garrulus glandarius.</i>

Species.	No. of specimens in Leiden Mus.	No. of slides.	Hosts.
<i>D. icteroides</i> Nitzsch	11 (? ♀♀ & ? ♂♂).	4	<i>Anas tadorna</i> . <i>Mareca penelope</i> . "un canard."
<i>D. incompletus</i> Nitzsch	4 (? ♀♀ & ? ♂♂).	2	<i>Ciconia alba</i> .
<i>D. intermedius</i> Piaget	5 (? ♀♀ & ? ♂♂).	2	<i>Haliaeetus vociferoides</i> .
<i>D. lari</i> O. Fabricius	8 (? ♀♀ & ? ♂♂).	3	<i>Larus argentatus</i> . <i>Larus canus</i> . <i>Larus glaucus</i> . <i>Larus fuscus</i> .
<i>D. lari</i> var. <i>breviappendiculatus</i> Piaget.	2 ♀♀, 1 ♂.	1	
<i>D. laricola</i> Nitzsch	7 (? ♀♀ & ? ♂♂).	3	<i>Sterna minuta</i> . <i>Sterna nigra</i> .
<i>D. latifrons</i> Nitzsch	5 (? ♀♀ & ? ♂♂).	2	<i>Cuculus canorus</i> .
<i>D. leontodon</i> Nitzsch	4 (? ♀♀ & ? ♂♂).	1	<i>Sturnus vulgaris</i> .
<i>D. leontodon</i> var. <i>affinis</i> Piaget ..	2 ♀♀, 1 ♂.	1	<i>Sturnus cristatellus</i> .
<i>D. limosæ</i> Denny	1 ♀, 1 ♂.	1	<i>Limosa melanura</i> .
<i>D. melanocephalus</i> Nitzsch	1 ♀.	1	<i>Sterna cantiaca</i> .
<i>D. ocellatus</i> Scopoli	7 (? ♀♀ & ? ♂♂).	3	<i>Corvus corone</i> . <i>Corvus cornix</i> . <i>Phœnicopterus antiquorum</i> . "un canard."
<i>D. pilosus</i> Piaget	2 ♂♂.	1	<i>Falco tinnunculus</i> .
<i>D. platæ</i> Denny	1 ♀, 1 ♂.	1	<i>Platycercus betrandi</i> .
<i>D. platysomus</i> Nitzsch	1 ♂.	1	<i>Lestris pomarina</i> .
<i>D. protusus</i> Piaget	1 ♀, 1 ♂.	1	<i>Strix flammea</i> .
<i>D. pustulosus</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Charadrius minor</i> .
<i>D. rostratus</i> Nitzsch	2 ♀♀, 1 ♂.	1	<i>Corvus pica</i> .
<i>D. semivittatus</i> Giebel	1 ♀.	1	<i>Picus viridis</i> .
<i>D. subcrassipes</i> Nitzsch	2 ♀♀.	1	<i>Vanellus cristatus</i> .
<i>D. superciliosus</i> Nitzsch	2 ♀♀, 1 ♂.	1	<i>Numenius arquata</i> .
<i>D. temporalis</i> Giebel	2 ♀♀.	1	<i>Ciconia nigra</i> .
<i>D. testudinarius</i> Denny	2 ♀♀, 1 ♂.	1	<i>Cygnus musicus</i> .
<i>D. tricolor</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Plotus cantiaca</i> .
<i>Ornithobius bucephalus</i> Giebel ...	2 ♀♀.	1	<i>Rougetius bernieri</i> .
<i>Acidoproctus maximus</i> Piaget	1 ♂.	1	<i>Porphyrio melanotus</i> .
<i>Oncophorus affinis</i> Piaget	2 ♀♀, 1 ♂.	1	<i>Gallinula chloropus</i> .
<i>O. fallax</i> Piaget	1 ♀, 1 ♂.	1	<i>Parra sinensis</i> .
<i>O. minutus</i> Nitzsch	2 ♀♀, 1 ♂.	1	<i>Gracula religiosa</i> .
<i>O. sulcatus</i> Piaget	1 ♀.	1	<i>Syrhaptus paradoxus</i> .
<i>Nirmus acutangulatus</i> Piaget	1 ♀, 1 ♂.	1	<i>Strix otus</i> .
<i>N. alchatae</i> Rudow	2 ♀♀.	1	<i>Barita</i> sp. ?
<i>N. angulatus</i> Piaget	1 ♀.	1	<i>Dromæus nov.-hollandiæ</i> .
<i>N. argulus</i> Nitzsch	3 ♀♀.	1	<i>Charadrius minor</i> .
<i>N. asymmetricus</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Recurvirostra avocetta</i> .
<i>N. bicuspis</i> Giebel	4 (? ♀♀ & ? ♂♂).	3	<i>Vanellus cristata</i> . <i>Ampelis garrula</i> .
<i>N. brachythorax</i> Giebel	5 (? ♀♀ & ♂♂).	2	
<i>N. brachythorax</i> var. <i>modularis</i> Piaget.	1 ♀, 1 ♂.	1	<i>Accentor modularis</i> .

Species.	No. of specimens in Leiden Mus.	No. of slides.	Hosts.
<i>N. cingulatus</i> Nitzsch	2 ♂♂.	1	<i>Sterna nigra</i> .
<i>N. decipiens</i> Nitzsch	3 ♀♀.	2	<i>Charadrius minor</i> .
<i>N. delicatus</i> Nitzsch	2 ♀♀, 1 ♂.	2	<i>Recurvirostra avocetta</i> .
			<i>Emberiza hortulana</i> .
			<i>Porphyrio smaragdinus</i> .
<i>N. densilimbus</i> Nitzsch	1 ♀.	1	<i>Pyrrhula vulgaris</i> .
<i>N. dilatofasciatus</i> Piaget	3 ♀♀.	1	<i>Endynamis pictus</i> .
<i>N. fuscomarginatus</i> Denny	1 ♀.	1	<i>Podiceps cristata</i> .
<i>N. fuscus</i> Nitzsch	3 ♂♂.	1	<i>Ardea gularis</i> .
<i>N. holophæus</i> Nitzsch	3 (? ♀♀ & ? ♂♂).	1	<i>Numenius arquata</i> .
<i>N. lineolatus</i> Nitzsch	2 ♂♂.	1	<i>Larus glaucus</i> .
<i>N. ochropygus</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Hæmatopus ostralegus</i> .
<i>N. olivaceus</i> Nitzsch	1 ♀, 1 ♂.	1	<i>Nucifraga caryocatactes</i> .
<i>N. phænotus</i> Nitzsch	5 (? ♀♀ & ? ♂♂).	2	<i>Sterna nigra</i> .
			<i>Sterna minuta</i> .
<i>N. pileus</i> Nitzsch	5 (? ♀♀ & ? ♂♂).	2	<i>Recurvirostra avocetta</i> .
<i>N. quadrulatus</i> Nitzsch	4 (? ♀♀ & ? ♂♂).	1	<i>Tetrao urogallus</i> .
<i>N. rufus</i> Nitzsch	9 (? ♀♀ & ? ♂♂).	2	<i>Accipiter nisus</i> .
<i>N. rufus</i> var. <i>socialis</i> Giebel	5 (? ♀♀ & ? ♂♂).	3	<i>Falco tinnunculus</i> .
			<i>Circus rufus</i> .
<i>N. sellatus</i> Rudow	4 (? ♀♀ & ? ♂♂).	3	<i>Larus canus</i> .
			<i>Larus argentatus</i> .
<i>N. signatus</i> Piaget	6 (? ♀♀ & ? ♂♂).	3	<i>Recurvirostra avocetta</i> .
<i>N. subcuspidatus</i> Nitzsch	2 ♀♀, 1 ♂.	1	<i>Eurystomus temminckii</i> .
<i>N. triangulatus</i> Nitzsch	2 ♀♀.	1	<i>Lestris pomarina</i> .
<i>N. truncatus</i> Nitzsch	2 ♀♀.	1	<i>Phalaropus hyperboreus</i> .
<i>N. uncinus</i> Nitzsch	1 ♀.	1	<i>Corvus corone</i> .

[To be continued.]

VIII.—A Review of the Genera of the Psychopsidæ (*Neuroptera*), with a Description of a new Species. By D. E. KIMMINS, Department of Entomology, British Museum (Natural History).

[Plate VIII.]

In 1919, in his series on Australian Neuroptera (Proc. Linn. Soc. N.S.W. xliii. pp. 750–786) Dr. Tillyard discussed the status of the various genera erected by Navás in the family Psychopsidæ, and made an extensive review of the characters used by Navás for his tribes and genera. His

conclusion was that the division of the family into tribes was unjustified, and was based on unreliable characters (arrangement of gradate cross-veins etc.). He also showed that the generic characters proposed by Navás were equally unreliable, and in dealing with the fauna of the Australian region he placed all but two species in the genus *Psychopsis*.

This treatment of the problem may have advantages when dealing with a regional fauna, but if applied to all members of the family would result in the formation of a genus composed of very heterogeneous forms and in the association of species from different zoo-geographical regions. I have recently been examining the species of Psychopsidæ in the British Museum and McLachlan collections, and I believe that characters may be found whereby the family may be divided into more uniform groups, most of them confined to separate regions. For these genera it is possible to use the generic names already existing (as defined by their genotypes), although in many cases new diagnoses will be required.

The chief characters upon which I am basing this arrangement of the genera are the presence or absence of an anastomosis between *M* and *Cu* in the fore wing, coupled with the general type of wing-pattern. In most cases it appears that the presence of such an anastomosis is accompanied by a wing-pattern formed of transverse fasciæ, whilst the absence of anastomosis is associated with a mottled wing-pattern.

There are, of course, exceptions to this rule—for example, *Wernzia cœlivagus*, in which anastomosis takes place at a point only—but, taking a broad view, I think this character of the anastomosis is worthy of more attention than was accorded it by Tillyard. The fact that the application of this character results in the genotype of *Psychopsis* being removed from Navás's Psychopsini to his Zygophlebini does not make it a poor character, but indicates rather that Navás had the wrong conception of the genus *Psychopsis* and consequently of the tribe Psychopsini. For further division I have made use of the presence or absence of a conspicuous spot towards the apex of the hind wing, for it is an interesting feature that with about one exception all the species with this marking are from the Australian region, and all those

without it or with only a very small spot are from Asiatic and African localities.

I am including in this paper a key and new diagnoses of the genera of the Psychopsidæ, and also a list of the species which I consider should be assigned to these genera. The references are not intended to be exhaustive, but merely to indicate in which genera the respective species have been placed. There is little new synonymy; amongst the genera, *Psychomorphe* Krüger falls to *Notopsychops* Tillyard, and *Psychopsella* Tillyard and *Orientichopsis* Kuwayama appear to be congeneric with *Balmes* Navás. *Zygophlebius leoninus* Navás and *Psychopsis felina* Navás are, I think, merely forms of *Notopsychops zebra* (Brauer).

Key to Genera of Psychopsidæ.

1. Ocelli vestigial; fore and hind wings of almost equal width, with numerous branches to *Rs*. Posterior margin of fore wing deeply excavate; fore wing with raised areas *Megapsychops* Tillyard.
- Ocelli absent; hind wing distinctly narrower than fore wing, whose posterior margin is straight or only slightly excised 2.
2. *M* and *Cu* in fore wings anastomosing for a considerable distance; fore wings generally with transverse fasciæ 3.
- M* and *Cu* meeting at a point (or for a short distance) and diverging again, or anastomosis absent; fore wings generally mottled 5.
3. Hind wing with a prominent round spot towards apex *Psychopsis* Newman.
- Hind wing with a very small spot towards apex of *R* 4.
4. Wings opaque whitish, with brown markings *Cabralis* Navás.
- Wings yellowish *Notopsychops* Tillyard.
5. In fore wing *M* and *Cu* meeting at a point or for a short distance only *Wernzia* Navás.
- Anastomosis absent 6.
6. Hind wing with large spot towards apex. Hind wing without large spot towards apex *Magallanes* Navás.
- 7.
7. Hind wing less than half the width of fore wing *Balmes* Navás.
- Hind wing about two-thirds the width of fore wing *Silveira* Navás.

MEGAPSYCHOPS Tillyard.

Ocelli vestigial. Fore and hind wings of almost equal width, with the branches of *Rs* extremely numerous (27–32 in fore wing, 18–24 in hind), very close together, so as to give the wing the appearance of the close texture of spun silk. Dorsal margin strongly excavated before the tornus, the latter very prominent, especially in the fore wing. *M* at least four-branched. Fore wing with raised or embossed areas.

Distribution.—Queensland.

PSYCHOPSIS Newman.

Ocelli absent; hind wing distinctly narrower than fore wing, whose posterior margin is slightly excised. *M* and *Cu* in fore wing anastomosing for a considerable distance. Fore wing with transverse fasciæ, hind wing with prominent round spot towards apex.

Distribution.—Australia.

CABRALIS Navás.

Ocelli absent; hind wing narrower than fore wing, whose posterior margin is straight; *M* and *Cu* anastomosing; hind wing with small spot towards apex of *R*. Wing-membrane whitish, with brown markings.

Distribution.—E. Africa.

NOTOPSYCHOPS Tillyard.

Ocelli absent; hind wing narrower than fore wing, whose posterior margin is straight; *M* and *Cu* anastomosing; a long branch arising from M_2 and joining M_1 , running parallel with them for most of its length; hind wing with small spot towards apex of *R*. Wing-membrane yellowish, with a number of pale brown transverse fasciæ.

Distribution.—S. and E. Africa.

WERNZIA Navás.

Ocelli absent; hind wing narrower than fore wing, whose posterior margin is straight. *M* and *Cu* meeting at a point (in *maculipennis* for a short distance) and diverging again. Hind wing with conspicuous spot towards apex.

Distribution.—Australia.

MAGALLANES Navás.

Ocelli absent; hind wing narrower than fore wing, with a conspicuous spot. No anastomosis in fore wing. Wing-membrane with mottled pattern.

Distribution.—Australia.

BALMES Navás.

Ocelli absent; no anastomosis in fore wing, no branch vein between M_1 and M_2 : hind wing less than half width of fore, and without conspicuous spot. Wing-membrane mottled.

Distribution.—Australia, Burma, Tibet, China, Formosa.

SILVEIRA Navás.

Ocelli absent; no anastomosis in fore wing, but a branch vein between M_1 and M_2 , as in *Notopsychops*: hind wing about two-thirds the width of fore, and without conspicuous spot. Wing-membrane mottled.

Distribution.—Africa.

Silveira jordani, sp. n. (Pl. VIII., A-C; text-fig. 1.)

Smaller than *S. marshalli* (McL.), and with less evident mottling of the fore wing.

♂. Head tawny, with brownish markings as in *marshalli*. Pronotum fuscous, without orange-yellow spots; meso- and metanota dark fuscous. Legs dingy yellow. Abdomen fuscous above, paler beneath. Anal plates yellowish, triangular from side, with rounded apices; from behind somewhat caliper-shaped. No angular dilatation of the lower margin of the anal plates. (This dilatation is conspicuous in *marshalli*.) Median hook of ædeagus long, tapering gradually to a subacute apex (in *marshalli* this hook has the form of a slender spine).

Wings pale brownish, fore wing more triangular and less rounded than in *marshalli*, very finely and densely speckled, with four indistinct brownish marks along the "vena triplica." Costal region narrower than in *marshalli*. Branch vein between M_1 and M_2 much shorter.

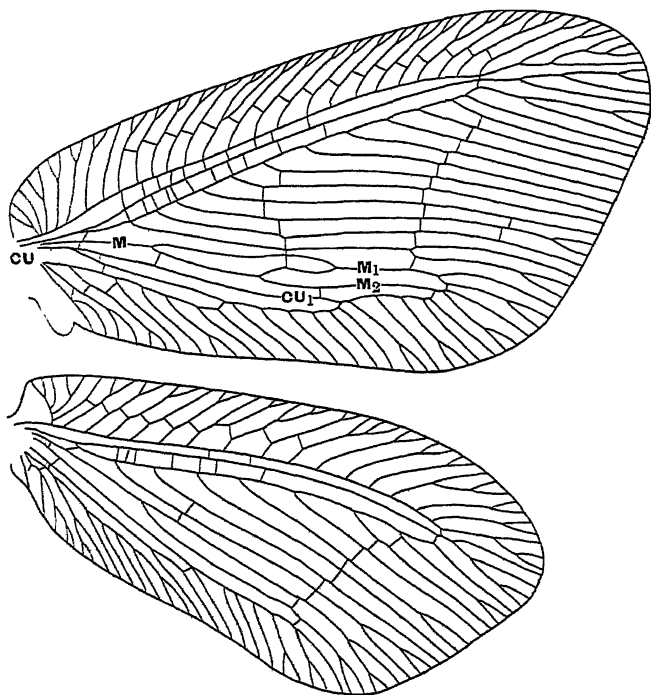
Length of fore wing .. 10–14 mm.

„ hind wing .. $8\frac{1}{2}$ –11 mm.

S.W. AFRICA : Naukluft, 1300–1500 m., 7–10. xii. 33 ; Satansplatz, 1300 m., 17–18. xii. 33 (*K. Jordan*). Cape Province, Swellendam, 9–14. xii. 31 (*R. E. Turner*).

Type ♂ (from Naukluft) and ♂ paratypes in the British Museum Collection.

Fig. 1.



Wings of *Silveira jordani*, sp. n., ♂.

Psychopsidæ Navás, 1916.

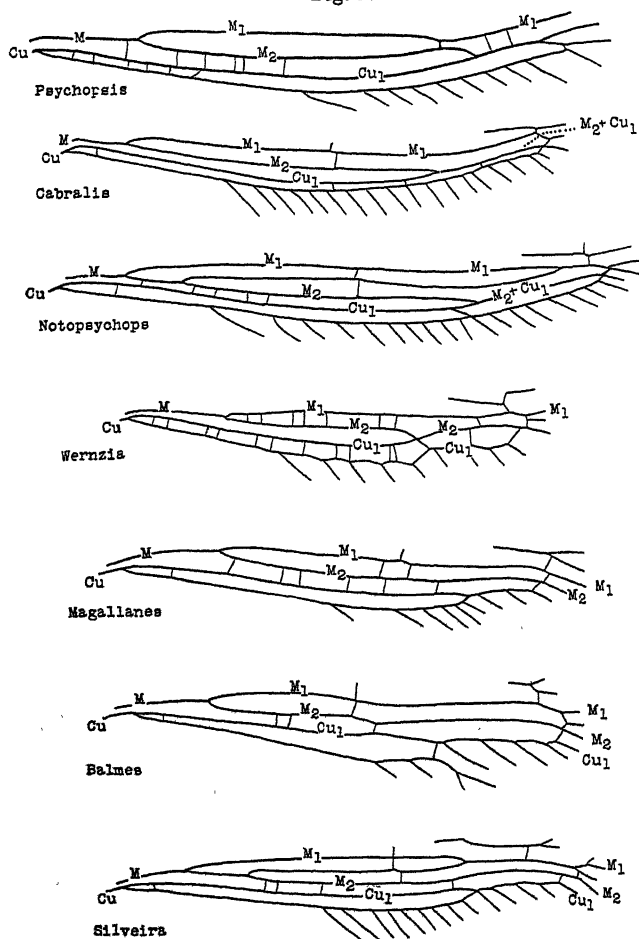
Asoc. Esp. Progr. Cienc. Congr. Vallodolid, 1915, pp. 181–210.

MEGAPSYCHOPS Tillyard, 1919.

Proc. Linn. Soc. N.S.W. xliii. p. 771. Genotype : *Psychopsis illidgei* Froggatt.

illidgei Froggatt, 1903, Proc. Linn. Soc. N.S.W. xxviii. p. 455 (*Psychopsis*) ; Tillyard, 1919, Proc. Linn. Soc. N.S.W. xliii. p. 771 (*Megapsychops*). **Queensland, Mt. Tambourine.**

Fig. 2.



Arrangement of medius and cubitus in anterior wing of certain genera of Psychopsidae.

PSYCHOPSIS Newman, 1842.

Entomologist, i. p. 415. Hagen, 1866, Stett. Ent. Z. xxvii. p. 375. Genotype: *Psychopsis mimica* Newman.

= *Arteriapteryx* Guérin, 1845, Iconogr. Règn. Anim. iii. p. 389. Genotype: *A. elegans* Guérin.

= *Zygophlebius* Navás, 1910 (partim), Brotéria, Zool. ix. p. 82. Genotype: *Z. verreauxinus* Navás = *P. elegans* Guérin.

barnardi Tillyard, 1925, Proc. Linn. Soc. N.S.W. l. p. 388.
Queensland.

birmana McLachlan, 1891. See *Balmes*.

cælivagus Walker, 1853. See *Wernzia*.

dumigani Tillyard, 1922, Austral. Zool. iii. p. 36. **Queensland.**

= *notha* Navás, 1928, Bol. Soc. ent. Esp. xi. p. 65.

elegans Guérin, 1845, Iconogr. Règn. Anim. iii. p. 389
(*Arteriapteryx*). **New Holland.** Hagen, 1866, Stett.
Ent. Z. xxvii. p. 458 (*Psychopsis*). Tillyard, 1919,
Proc. Linn. Soc. N.S.W. xliii. p. 777.

= *mimica* Froggatt, 1902, Proc. Linn. Soc. N.S.W. xxvii. p. 367.

= *newmanni* Froggatt, 1903, Proc. Linn. Soc. N.S.W. xxvii. p. 454.

= *verreauxinus* Navás, 1910, Brotéria, Zool. ix. p. 84 (*Zygophlebius*).

felina Navás, 1912. See *Notopsychops*.

gracilis Tillyard, 1919, Proc. Linn. Soc. N.S.W. xliii.
p. 777. **New South Wales.**

illidgei Froggatt, 1903. See *Megapsychops*.

insolens McLachlan, 1866. See *Magallanes*.

leoninus Navás, 1910. See *Notopsychops*.

maculipennis Tillyard, 1925. See *Wernzia*.

margarita Tillyard, 1922, Austral. Zool. iii. p. 37. **New
South Wales.**

marshalli McLachlan, 1902. See *Silveira*.

meyricki McLachlan, 1887. See *Magallanes*.

mimica Newman, 1842, Entomologist, i. p. 415. **South
Australia.** Tillyard, 1919, Proc. Linn. Soc. N.S.W.
xliii. p. 775.

mimica Froggatt, 1902. See *P. elegans* Guérin.

nebulosa Van der Weele, 1907. See *Silveira*.

newmanni Froggatt, 1903. See *P. elegans* Guérin.

notabilis Navás, 1912. See *Balmes*.

notha Navás, 1928. See *P. dumigani* Tillyard.

terissinus Navás, 1910. See *Balmes*.

verreauxinus Navás, 1910. See *P. elegans* Guérin.

zebra Brauer, 1889. See *Notopsychops*.

CABRALIS Navás, 1912.

Brotéria, Zool. x. p. 109. Genotype: *C. gloriosus* Navás.
gloriosus Navás, 1912, Brotéria, Zool. x. p. 110. **Portu-
guese E. Africa.**

NOTOPSYCHOPS Tillyard, 1919.

Proc. Linn. Soc. N.S.W. xliii. p. 759. Genotype : *Psychopsis zebra* Brauer.

=*Zygophlebius* Navás, 1916 (*nec* 1910), Asoc. Esp. Progr. Cienc. Congr. Valladolid, 1915, p. 181-210. Genotype : *Psychopsis zebra* Brauer.

=*Psychomorphe* Krüger, 1922, Stett. Ent. Z. lxxxiii. p. 44. Genotype : *Psychopsis zebra* Brauer. Syn. nov.

zebra Brauer, 1889, Ann. Hofmus. Wien, iv. p. 102 (*Psychopsis*). **C. Africa.** Navás, 1916, Asoc. Esp. Progr. Cienc. Congr. Valladolid, 1915, pp. 181-210 (*Zygophlebius*). Tillyard, 1919, Proc. Linn. Soc. N.S.W. xliii. p. 759 (*Notopsychops*). Krüger, 1922, Stett. Ent. Z. lxxxiii. p. 44 (*Psychomorphe*).

=*leoninus* Navás, 1910, Brotéria, Zool. ix. p. 83 (*Zygophlebius*). **E. Africa.** Syn. nov.

=*felina* Navás, 1912, Brotéria, Zool. x. p. 111. (*Psychopsis*). Portuguese **E. Africa.** Syn. nov.

WERNZIA Navás, 1912.

Mem. R. Acad. Cienc. Barcelona, x. (9) p. 63. Genotype : *Hemerobius cœlivagus* Walker.

cœlivagus Walker, 1853, List Neur. Ins. B.M. ii. p. 279 (*Hemerobius*). **Australia.** Hagen, 1866, Stett. Ent. Z. xxvii. p. 458 (*Psychopsis*). Navás, 1912, Mem. R. Acad. Cienc. Barcelona, x. (9) p. 63 (*Wernzia*). Tillyard, 1919, Proc. Linn. Soc. N.S.W. xliii. p. 778 (*Psychopsis*).

? *maculipennis* Tillyard, 1925, Proc. Linn. Soc. N.S.W. l. p. 389 (*Psychopsis*). **W. Australia.**

MAGALLANES Navás, 1912.

Mem. R. Acad. Cienc. Barcelona, x. (9) p. 69. Genotype : *Psychopsis insolens* McLachlan.

insolens McLachlan, 1866, Journ. Entom. ii. p. 114 (*Psychopsis*). **N. Australia.** Navás, 1912, Mem. R. Acad. Cienc. Barcelona, x. (9), p. 69 (*Magallanes*). Tillyard, 1919, Proc. Linn. Soc. N.S.W. xliii. p. 779 (*Psychopsis*).

meyricki McLachlan, 1887, Ent. Mon. Mag. xxiv. p. 30 (*Psychopsis*). **New South Wales.** Navás, 1916, Asoc. Esp. Progr. Cienc. Congr. Valladolid, 1915, p. 197 (*Magallanes*). Tillyard, 1919, Proc. Linn. Soc. N.S.W. xliii. p. 779 (*Psychopsis*).

BALMES Navás, 1910.

Brotéria, Zool. ix. p. 85. Genotype: *Balmes terissinus* Navás=*Psychopsis birmana* McL.

=*Psychopsella* Tillyard, 1919, Proc. Linn. Soc. N.S.W. xliii. p. 780.

Genotype: *Psychopsella gallardi* Tillyard. **Syn. nov.**

=*Orientichopsis* Kuwayama, 1927, Ins. Matsum. i. p. 123. Genotype: *Psychopsis* (*Orientichopsis*) *formosana* Kuwayama. **Syn. nov.**

birmana McLachlan, 1891, Ent. Mon. Mag. (2) ii. p. 321 (*Psychopsis*). **Burma.**

=*terissinus* Navás, 1910, Brotéria, Zool. ix. p. 85 (*Balmes*). Tibet.

=*notabilis* Navás, 1912, Mem. R. Acad. Cienc. Barcelona, x. (9) p. 65 (*Balmes*). China.

formosana Kuwayama, 1927, Ins. Matsum. i. p. 123 (*Orientichopsis*). **Formosa.**

gallardi Tillyard, 1919, Proc. Linn. Soc. N.S.W. xliii. p. 780 (*Psychopsella*). **New South Wales.**

SILVEIRA Navás, 1912.

Mem. R. Acad. Cienc. Barcelona x. (9) p. 64. Genotype: *Silveira marmoratus* Navás=*Psychopsis marshalli* McL.

=*Psychophasis* Krüger, 1922, Stett. Ent. Z. lxxxiii. p. 44. Genotype: *Psychopsis marshalli* McLachlan.

marshalli McLachlan, 1902, Ent. Mon. Mag. xxxviii. p. 234 (*Psychopsis*). **Mashonaland.** Krüger, 1922, Stett. Ent. Z. lxxxiii. p. 44 (*Psychophasis*).

=*nebulosa* Van der Weele, 1907, Notes Leiden Mus. xxviii. p. 146 (*Psychopsis*). S. Africa.

=*marmoratus* Navás, 1912, Mem. R. Acad. Cienc. Barcelona, x. (9) p. 64 (*Silveira*). Mashonaland.

jordani, sp. n. **S.W. Africa.**

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<i>Megapsychops</i>	147, 149	<i>Silveira</i>	148, 153
<i>Notopsychops</i>	147, 152	<i>Wernzia</i>	147, 152
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EXPLANATION OF PLATE VIII.

A-C. *Silveira jordani*, sp. n., ♂. Apex of abdomen: A, from side, B, from behind; C, tenth sternite and aedeagus from side.

D. Wing-pattern of *Psychopsis elegans* (Guérin).

E. " " *Notopsychops zebra* (Brauer).

F. " " *Silveira marshalli* (McL.).

IX.—*On the Bees of the Genera Osmia and Megachile from Cyprus (Apoidea).*—I. By G. A. MAVROMOUSTAKIS, Limassol, Cyprus.

THE present paper is based on a part of the rich material of bees collected by me from Cyprus during the years 1922–1938, and the types of the new species and the new variety are in my collection.

OSMIA.

G. A. Mavromoustakis, Ann. & Mag. Nat. Hist. (10) xx. pp. 520–525, 1937; (11) ii, pp. 464–473, 1938.

Osmia paradoxa Friese.

Nicosia; Limassol; Amathus (ruins); Episcopi; Ayios Athanasios; both sexes during March and April, at the flowers of *Hymenocarpus*, Leguminosæ, *Echium*. It nests in empty shells of *Helicella protea mavromoustakisi* Haas, *Eobania vermiculata* Müll., and uses a gummy material for the construction of its cells.

Osmia monstrosa J. Pér.

Amathus, both sexes during March and April, at Leguminosæ, and nests in small crevices of large stones.

Osmia glutinosa Gir. (= *Osmia tiplensis* F. Mor.).

Pera Pedi, 2500 ft.; Kykkou Monastery; Mt. Troodos, 5500 ft.; both sexes during May and June, at *Salvia*.

Osmia scutellaris F. Mor.

Limassol, during April and May, at Compositæ.

Osmia ligurica F. Mor.

Limassol; Yermasoyia River; Pera Pedi; both sexes during April and May, at *Anthemis*, and nests in dry stems of *Rubus*.

Osmia acuticornis D. & P.

Limassol; Amathus; Yermasoyia River; both sexes during March and April, at Leguminosæ. The nest was taken near Limassol in a dry stem of *Scilla*.

Osmia ruficollis Dours (= *Osmia sybarita* Smith).

Nicosia; Limassol; Yermasoyia River; Akrotiri Forest; both sexes during February and March, at *Hymenocarpus*, *Vicia*, Leguminosæ.

This species nests in empty shells of several land shells (*Helicella protea mavromoustakisi* Haas, *larnacensis* Kob., *Helicella cretica sitiensis* Malz., and *Helicella syrensis carinato-globosa* Haas), and the parasite *Chrysis dichroa* Dhlb. was taken from its nest.

Osmia crenulata F. Mor.

Nicosia; Limassol; Ayios Athanasios; Akrotiri Forest; Mesayitonia; both sexes during April and May, at *Echium*.

Osmia andrenoides Spin.

Limassol, during May and June, at *Echium*, *Medicago*.

Osmia ferruginea Latr.

Nicosia, March, at *Papaver*; Limassol; Akrotiri Forest; Ayia Phyla; Ayios Athanasios; Yermasoyia River; Amathus; both sexes during February, March and April, at *Vicia*, *Hymenocarpus*, Leguminosæ, and nests in empty shells of *Eobania vermiculata* and *Helix cincta chassyana* Kob.

I have collected a gynandromorphic specimen of *Osmia ferruginea* near Yermasoyia River, 20. ii. 37, also in the same locality and date 7 ♂♂, 2 ♀♀, normal specimens of the same species. This interesting specimen belongs to the partial lateral gynandromorphic type, and its head is divided longitudinally into right and left halves, the right half being *female* (pilosity, colour of integument, punctation and antennæ), and the left half *male*. Thorax, legs, wings, and abdomen are as in the normal *male*; the anterior femora of the right half have reddish hairs beneath as in the *female*, and the anterior femora of the left half have white hairs as in the *male*. Otherwise the legs are haired as in the *male*.

Osmia (Chalcosmia) cypricola Mavromoustakis.

Paraklisha, during March, at Leguminosæ.

Osmia (Chalcosmia) nicosiana, sp. n.

Female.—Length 6 mm.

Head metallic dark bluish green; clypeus very dark bluish black (in some paratypes bluish black), densely punctured, shining, apical margin straight and not elevated; mandibles tridentate and black; antennæ

black; clypeus, sides of face with shining white hairs, apical margin of clypeus broadly with light golden hairs; vertex and occiput with sparse and somewhat long yellow-grey hairs; cheeks with shining white hairs. Mesonotum and scutellum dark bluish green (in some paratypes bluish black), densely punctured, shining, with some light greyish-yellow hairs; wings clear, apical margin very slightly clouded; stigma black; legs black, with shining white hairs; spurs yellowish brown; hind basitarsi with dense and short light yellow-brown hairs on inner side; thorax with shining white hairs at sides; area of metathorax shining. Abdominal tergites 1 to 3 metallic dark bluish green, second and third with basal metallic tints; rest of tergites very dark bluish black (in some paratypes fourth and fifth tergites very dark bluish green, fourth with basal metallic tints); first and second tergites densely punctured; first tergite with dense lateral shining white hairs; second tergite with lateral apical shining white hair-band; tergites 3 to 5 with thin entire apical shining white hair-bands; sixth tergite densely covered with very short white hairs; ventral scopa shining greyish white.

Male.—Length 6.5 mm.

Head and thorax metallic deep bronze-green (in some paratypes dark bronze-green); head below antennæ with dense and long white hairs; antennæ long and not modified. Thorax with longer yellowish-grey hairs. Abdomen dark bronze-green (in some paratypes tergites with metallic tints); first tergite with lateral dense shining white hairs; second tergite with thin entire greyish-white apical hair-band, attenuated or interrupted in the middle; tergites 3 to 6 with short yellow-grey hairs (in some paratypes the hairs white), forming entire and thin apical hair-bands; apical margin of sixth tergite nearly rounded, narrowly polished, shining and brown; seventh tergite with two somewhat short and thick lateral spines obtuse in the apex, and a very short spine-like projection in the middle. First sternite short and convex, with a very slight, short and polished carina in the middle of apical margin; second sternite large, with subapical transverse very narrow depression, apical margin angular and pointed in the middle; fourth sternite with the apical margin

nearly straight, sides obliquely truncate, and with greyish-white apical hairs.

Ayia Phyla, 1 ♀ (type), 22. ii. 38. Yermasoyia River, 1 ♀ (paratype), 18. iii. 31; 1 ♀ (paratype), 20. iii. 31; 1 ♀ (paratype), 19. iii. 31; 1 ♀ (paratype), 12. iii. 31; 2 ♂♂ (paratypes), 10. iii. 31; 1 ♂ (allotype), 1 ♀, 5 ♂♂ (paratypes), 27. ii. 37; both type and allotype are fresh specimens. Amathus (ruins), 1 ♂ (paratype), 9. iii. 35; 2 ♀♀ (paratypes), 5. iv. 29; 1 ♀ (paratype), 10. iv. 29; 1 ♀ (paratype), 28. ii. 35.

Osmia nicosiana, sp. n., is related to *Osmia angulata* J. Pér., from Algeria, but is very different. *Osmia angulata* has the colour of the integument, scopa, pilosity, and the form of the apical margin of clypeus different.

Osmia nicosiana visits the flowers of *Hymenocarpus circinnatus* L., and some other Leguminosæ, and nests in empty land shells of *Eobania vermiculata*, *Helicella protea mavromoustakisi*, *Helicella cyparissias* Pf.

Osmia submicans F. Mor.

Limassol; Amathus; Yermasoyia River; Mesayitonia; both sexes during February and March, at *Hymenocarpus*, Leguminosæ.

Osmia leucogaster F. Mor.

Nicosia; Limassol; Mesayitonia; Amathus; Yermasoyia River; both sexes during March and April, at *Achillea*, Compositæ.

Osmia latreillei Spin.

Limassol; Yermasoyia River; Amathus; both sexes during February and March, at *Sinapis*, *Oxalis*, *Achillea*, *Anthemis*, Compositæ.

Osmia cærulescens L.

Staurovouni, 2500 ft., 1 ♀, May 1922, at *Salvia*. Mt. Troodos, during June and July, at *Salvia*. Limassol, both sexes during March, at Leguminosæ.

Osmia vidua laticincta J. Pér.

Limassol; Yermasoyia River, both sexes during March and April, at *Centaurea*, Compositæ.

Osmia rufa L., var.

Säittas, 2500 ft., 1 ♀, 1 ♂, March 1937, at *Faba*.

MEGACHILE.

J. D. Alfken, Abh. Nat. Ver. Bremen, xxvi. p. 447, 1927.

T. D. A. Cockerell, Ann. & Mag. Nat. Hist. (10) vii. p. 274, 1931.

J. D. Alfken, Bull. Soc. Ent. Egypte, p. 223, 1932; Konowia, xii. pp. 57-58, 1933.

J. Noskiewicz, Polsk. Pismo Ent. xiii. p. 168, 1936.

V. B. Popov, Festschrift f. E. Strand, i. pp. 595-596, 1936.

G. A. Mavromoustakis, Ann. & Mag. Nat. Hist. (11) ii. pp. 464-473, 1938.

Megachile rotundata F.

Zakaki Meadow, both sexes during June and July, at Leguminosæ; September and October, at *Statice*.

Megachile apicalis Spin.

Limassol, during May and June, at *Centaurea*. Kyth-ræa, July, at *Thymus*.

Megachile provincialis J. Pér.

Limassol; Yermasoyia River; Akrotiri Bay; Pera Pedi; Mandria; both sexes during June and July, at *Statice*, *Centaurea*.

This species nests in the ground, using the leaves of *Rosa* and *Rubus* for the construction of its cells.

Of *Megachile provincialis* I have collected two anomalous specimens, near Limassol, 13. vi. 29, at *Centaurea cilicica* Boiss., having very interesting sexual abnormality as follows :—

Megachile provincialis J. Pér., *Intersex* 1.

Head as in the *male*; antennæ 12-jointed, last joint obliquely truncate in the apex. Thorax, wings and legs as in the *male*. Abdomen as in the *female*; ventral scopa entirely lacking.

Intersex 2.

Head as in the *male*; right antenna 12-jointed as in *intersex* 1; left antenna 13-jointed, last joint obliquely truncate; thorax, wings and legs as in the *male*. Abdomen as in the *female*; ventral scopa lacking; sting well projected.

Megachile sericans cyprica Ckll.

Limassol ; Yermasoyia River ; Paramali ; Mandria ; both sexes during June and July, at *Centaurea*, and nests in the ground.

Megachile (Archimegachile) flavipes Spin.

Limassol ; Cherkas ; Asomatos ; both sexes during July and August, at *Medicago*, *Leguminosæ*, *Eryngium*.

The nest of this species was taken in old cloths placed in a remote room of my house at Limassol, and consists of two elongate cells made from mud.

Megachile (Chalicodoma) ræwerti Alfken
var. *akrotirica*, nov.

Female.—Length 15 mm.

Wings strongly clouded ; first and second abdominal tergites with dense and bright yellowish-brown hairs, the hairs on second forming entire band ; tergites 3 to 5 with thick and dense entire yellowish-brown hair-bands, dense and short black and yellowish-brown hairs on the disk (in old specimens the hair-bands and the pilosity on the disk pale or very pale yellowish-brown) ; sixth tergite with short black hairs, the basal ones somewhat longer ; ventral scopa entirely yellowish brown.

Male.—Length 14 mm.

Similar to the *female* ; abdominal tergites 1 to 3 with bright and dense yellowish-brown hairs ; the hairs on second and third tergites forming entire and thick apical hair-bands ; fourth and fifth tergites with thick and dense entire yellowish-brown hair-bands, and with dense and short, black and yellowish-brown hairs on the disk (in very old specimens the hair-bands and the pilosity on the disk very pale yellowish brown or yellowish grey) ; sixth tergite with short black hairs ; seventh tergite with the apical margin nearly entire (in some specimens very slightly emarginate in the middle).

Akrotiri Forest, 1 ♀ (type), 23. v. 38, at *Teucrium* ; 1 ♂ (allotype), 20. v. 38. Mesayitonia, 4 ♀♀ (paratypes), 16. v. 37, at *Ballota* ; 2 ♀♀, 1 ♂ (paratypes), 11. v. 37. Ayios Athanasios, 2 ♀♀, 2 ♂♂ (paratypes), 24. v. 38, at *Ballota*. Pera Pedi, 2500 ft., 1 ♀, 1 ♂ (paratypes), 27. v. 29, at *Anchusa* ; 1 ♀ (paratype), 3. vi. 29, at

Teucrium. Episcopi, 2 ♀♀ (paratypes), 5. vii. 23, at *Echium*.

I have compared the above new form with a pair of *Megachile* (*Chalicodoma*) *ræveri* Alfken (paratypes), from Creta (kindly loaned by Mr. J. D. Alfken, Bremen), and the former has the hairs on the disk of tergites 3 to 5 black and yellowish brown and the sixth tergite covered with black hairs, and the latter has dense yellowish-brown hairs on the disk of tergites, and sixth tergite with yellowish-brown hairs. I possess 1 ♀ *Megachile* (*Chalicodoma*) *syraensis* Rad., from Palestine (a very fresh specimen), and it has the hairs on the last sternite black and the abdominal hair-bands grey.

X.—*A new Satyrid Butterfly.*

By H. T. G. WATKINS.

Corades pax, sp. n.

Nearest to *C. enyo enyo* Hewitson, but smaller (exp. 60–66 mm.); fore wing as dark from the base as in *enyo almo* Thieme, the spots browner and differing markedly both in size and position from either of the *enyo* races, the subcostal spot entirely absent, those in interspaces 5 and 6 not touching one another at the corners, and both the irregular spot in 2, 3, and the tornal spot much larger; hind wing uniform tawny brown as in *e. enyo*, but with dark tails and traces near the apex of a dark terminal border, the central band of the underside not showing through above. Underside of fore wing with the spots as above; of hind wing (and apex of fore wing) more silvered than in *enyo*, with traces only of a central band, the row of white dots beyond more distinct.

W. Venezuela; described from 3 ♂♂ in the Brit. Mus., labelled respectively Tachira, Pedregosa, and Quintero, 3000 m. Venezuela has already, in typical *enyo*, one well-marked local form of *Corades*, from the mountains near Caracas; *pax* is perhaps limited to the knot of mountains on the Colombian border, if not to the Merida Cordillera.

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XI.—*On some Tropical Polychætes in the British Museum, mostly collected by Dr. C. Crossland at Zanzibar, Tahiti, and the Marquesas.*—I. Families Amphinomidæ to Phyllodocidæ. By C. C. A. MONRO, Assistant Keeper, Department of Zoology, British Museum.

INTRODUCTION.

This collection which was in the main made by Dr. C. Crossland in the Red Sea at Zanzibar, and at a later date at Tahiti and the Marquesas, includes some material obtained by Prof. J. Stanley Gardiner in the Indian Ocean. I intended to write one report on the whole collection, but as I am obliged to give my time to other work and have little prospect of being able to continue with the present collection for some time, I have decided to publish as much of the report as was finished.

Among the Amphinomids I have redescribed the puzzling *Pseudeurythoë oculifera* (Augener), recorded four species of *Notopygos*, and reported the sexual, epitocous stage of *Pherecardia striata* (Kinberg). Among the Polynoids, the West Indian *Hermenia verruculosa*

Grube, in which the elytra are so much reduced as almost to have disappeared, is signalled from the Indian Ocean, and the rare *Harmothoë fraser-thomsoni* McIntosh is reported in considerable numbers from the Cape Verde Islands. Among the Phyllodocids I have redescribed *Phyllodoce gracilis* Kinberg, and have found it necessary to create three new species of *Phyllodoce*, two from Tahiti and one from the Marquesas. I have also doubtfully recorded both *Eulalia albopicta* Marenzeller and the European *Eulalia punctifera* Grube from Zanzibar.

Family Amphinomidae.

Genus EURYTHOË Kinberg.

Eurythoë complanata (Pallas).

Fauvel, 1932, p. 45, with citations.

Occurrence.—Crossland coll., Marquesas (numerous); Tahiti (numerous); Wasin, British East Africa (2 juv.); Red Sea, from coral (5); Sherm Sheikh, Red Sea (5 juv.); Aldabra Islands (8); Coll. Gardiner, Solomon Islands (4); Barachois, Diego Garcia (1); Coetivy (2); ? coll., Mangrove Swamp, Funafuti (2 juv.).

Distribution.—Eastern Mediterranean and all tropical seas.

Remarks.—Recently (1937 A) I recorded this very common tropical species from the Eastern Mediterranean, and added *Eurythoë syriaca* Kinberg to its synonyms.

Crossland has the following note on some of the living specimens taken at the Marquesas:—"Common in fine gravel under stones in the pool on the rock-shore shelf at Atuona. Not seen elsewhere yet. General resemblance to the species of the Panama side, but as locality so different describe anew. Colour slaty-grey above, pinkish below. Gills are bushy, but more or less in one plane; large so that those of adjacent segments almost touch; they intermingle when the worm is at all contracted. Dorsum much wrinkled, the raised areas being coloured blue-grey, the depressed lines pinkish. Gills partly dull greenish, partly red. Dorsal cirri, like the tentacles, have a green axis. The caruncle is not laminated in any way, but has two broad longitudinal folds generally somewhat waved or folded. Not free behind, greenish in colour."

Genus PSEUDEURYTHOË Fauvel.

Pseudeurythoë oculifera (Augener).

Paramphinoë oculifera Augener, 1913, p. 89, pl. ii. fig. 19, text-fig. 2, a-c.

Occurrence.—Crossland coll., Marquesas (7).

Distribution.—South-west Australia, Marquesas.

Description.—The specimens are stiffly coiled, and I cannot give an exact measurement. The size is about 10 mm. by 0.5 mm. for c. 50 chætigers. The body is elongate, quadrangular in section anteriorly and flattened posteriorly. The prostomium is bilobed, globular in front and heart-shaped behind (fig. 1 a). The palpostyles and the lateral tentacles are about equal and in most specimens, but not in all, faintly articulate. The median tentacle is inserted at the back of the heart-shaped prostomial lobe, which also carries two pairs of minute reddish eyes. This hinder prostomial lobe is embedded in the first chætiger, which carries dorsal and ventral cirri and chætæ but no hooks. The branchiæ begin on the 3rd chætiger and are continued to about the 9th. They consist of small, compact clusters of 3 or 4 filaments. The dorsal and ventral rami are well separated. The ventral cirri are shorter and stouter than the dorsal. The dorsal chætæ are of three kinds:—(1) long, simple, delicately serrated capillary chætæ; (2) shorter capillary bristles faintly geniculate, serrate on one edge and without a basal spur (fig. 1 b); (3) shorter and rather stouter bristles which I believe to be harpoon-bristles, though I cannot clearly see any teeth. In *Eurythoë* the teeth of the harpoon-bristles often disappear. The ventral bristles are also of three kinds:—(1) long, simple, delicately serrated capillaries; (2) slender bristles with a spur (fig. 1 c) and serrated along one edge; (3) short, furcate bristles (fig. 1 d), with the long arm coarsely serrated.

Remarks.—I have attributed these specimens to Augener's species in spite of the fact that the prostomium does not agree with that figured by him, and he makes no mention of the spurred type of ventral bristle. On the other hand, it is very difficult to make out the details of the prostomium on very small specimens, and the spur of the ventral bristles can only be seen at high

Fig. 1 a.

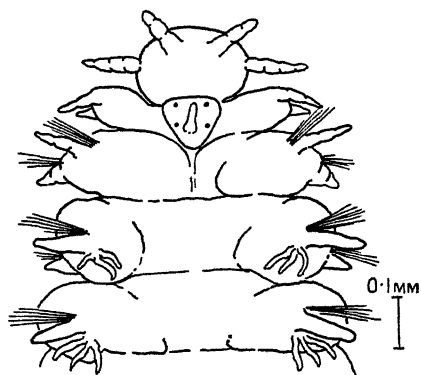


Fig. 1 c.

Fig. 1 b.

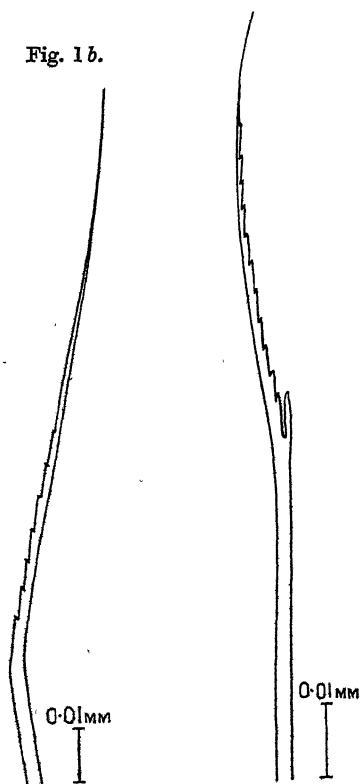


Fig. 1 d.



Pseudeurythoe oculifera (Augener).

a, anterior end from above ; b, geniculate dorsal bristle ; c, spurred ventral bristle ; d, furcate ventral bristle.

magnifications. In other respects the specimens agree with Augener's account. I also strongly suspect that *Linopherus canariensis* Langerhans is the same species, but the description is not sufficiently complete.

The present form differs from both *P. microcephala* Fauvel and *P. paucibranchiata* Fauvel, chiefly in the absence of a caruncle, the presence of which I have been unable to establish. *P. acarunculata* Monro has much in common with the present species in the shape of the head, absence of caruncle, and character of the bristles, but in my species the gills are continued to about the 50th chætiger.

Genus NOTOPYGOS Grube.

Notopygos megalops McIntosh.

McIntosh, 1885, p. 17, pl. i. fig. 1; pl. ii. A, figs. 3 & 4.

Fauvel, 1923, p. 133, fig. 48, *i-n*.

Monro, 1930, p. 30.

Occurrence.—Wasin, British East Africa, 10 fms., coll. Crossland (1).

Distribution.—Spain, Bermuda, Gulf of Guinea, British East Africa.

Remarks.—The specimen measures 10 mm. by 2 mm. at the widest part without the feet for 19 chætigers. There is no colour. There are two pairs of large eyes. The caruncle reaches to the 5th chætiger and the gills begin on the 7th. The anus is a small papilla dorsally at the hinder border of the 17th chætiger. There is a pair of stout pygidial styles. In the first few segments there are a few faint serrations on the ventral bristles. There is the usual triangular sculpturing on the dorsum.

This specimen differs from the others of the species known to me in that the anus does not lie in the terminal segment, and there are 19 chætigers instead of 17.

Notopygos gardineri Potts.

Potts, 1909, p. 362, pl. xlv. fig. 8; pl. xlvi. figs. 6–8.

Occurrence.—Crossland coll., Tahiti (1).

Distribution.—Amirante Islands, Tahiti.

Remarks.—A slender form measuring 42 mm. by 5 mm. without the feet for 31 chætigers. The anus opens on the 23rd. The back shows an elaborate, sculptured pattern and also faded and indistinct purple markings. The anterior faces of the gills are dark, and

the cirrophores of the lower dorsal cirri are dark purple. The mouth of the dorsal chæta-sac has a purple ring.

The caruncle extends to the anterior border of the 6th chætiger. It has a very high and narrow crest, the height of the crest being about equal to the width of the caruncular plate in the middle. The lateral laminae extend inwards further than they do in *N. variabilis*, but not quite so far as those in *N. labiatus*. This species is close to *N. variabilis*, but both the caruncle and the dorsal sculpturing show differences.

Notopygos labiatus McIntosh.

McIntosh, 1885, p. 19, pl. ii. fig. 6; pl. iv. fig. 2; pl. ii. A, figs. 5 & 6.
Fauvel, 1932, p. 57.

Occurrence.—Crossland coll., Zanzibar (1); Gardiner coll., Salmon Atoll (1)?

Distribution.—Laccadives, Hawaiian Islands, Philippines.

Remarks.—The specimen from Zanzibar has 28 chætigers and the anus opening on the 23rd. It is white and with long alabaster-like bristles. The caruncle has the lateral lamellæ extending inwards almost to the base of the crest. Dorsally a triangular fold is marked out at the anterior border of each segment. The specimen from Salmon Atoll is in poor condition and is doubtfully of this species.

Notopygos variabilis Potts.

Fauvel, 1932, p. 58, with citations.

Occurrence.—Crossland coll., Tahiti (1).

Distribution.—Maldives, Andamans, Nicobars.

Remarks.—The specimen measures 19 mm. by 4 mm. for 27 chætigers. The back has a chequered, dark purple pattern, and the anterior faces of the gills are dark at the base. Dorsal cirri are colourless. The crest of the caruncle lies on a flat plate laminated only at the edges. The anus opens in the 22nd chætiger.

Genus *Pherecardia* Horst.

Pherecardia striata (Kinberg).

Monro, 1924, p. 72, with citations.

Occurrence.—Crossland coll., Papeete Harbour (2); Tahiti (5).

Distribution.—Tropical Pacific.

Remarks.—The specimens of this very distinctive species taken in Papeete Harbour are very large. One is complete and measures about 140 mm. by 16 mm. without the feet for c. 70 chætigers. They were taken while swimming, and Crossland has the following note:—“The specimens were given to me by Mrs. Beatrice Grey of Moorea, with the following information. Collected on May 31st (three days after full moon), at 8 p.m. Seen swimming about on surface near the anchorage of their yacht in Papeete Harbour. Motion both by parapodia and undulations of the body. Placed in basin, the hind end of the caruncle was seen to rise and fall during progression. Caruncle light green. In the basin the worms broke up, smaller pieces from the tail-end separating. Formol in which they were preserved pink; under lens this seen to be eggs and sperm. Some specimens ended in a pointed tail, others abruptly. Larger specimens 6 to 9 inches long.”

In these giant epitocous forms, as far as can be seen in the present material, the body tapers posteriorly, but not more than in the atocous examples, and the anus is terminal.

Genus EUPHROSYNE Savigny.

Euphrosyne foliosa Andouin & Milne-Edwards.

Fauvel, 1923, p. 136, fig. 49, *a-g*; and 1932, p. 59, with citations.

Occurrence.—Crossland coll., Wasin, British East Africa (2); Red Sea (1).

Distribution.—Atlantic, Mediterranean, Indian Ocean, Red Sea.

Remarks.—The larger specimen from Wasin measures 4 mm. by 2 mm. for about 24 chætigers. The tips of the gills are slightly expanded.

Family Aphroditidæ.

Genus PONTOGENIA Claparède.

Pontogenia chrysocoma (Baird).

Fauvel, 1923, p. 38, fig. 13, *a-f*.

Occurrence.—Crossland coll., Wasin, British East Africa (4).

Distribution.—Mediterranean, Zanzibar.

Remarks.—The largest measures 22 by 9 mm. for 34 chætigers. I see no advantage in retaining Potts's var. *minuta* (Potts, 1910, p. 329), based on size alone. His specimens came from the same locality as these and measured 18 mm. in length.

Family Polynoidæ.

[The Polynoids collected by Crossland in Tahiti and the Marquesas have already been described by me in the Ann. & Mag. Nat. Hist. ser. 10, vol. ii. pp. 467-472 1928.]

Genus IPHIONE Kinberg.

Iphione muricata (Savigny).

Fauvel, 1932, p. 12, with citations.

Occurrence.—Crossland coll., Zanzibar, shore (2); Red Sea (5); Suakim Harbour (1); Gardiner coll., off white brown Holothurian, Manadu Reef, Maldives (1); Coetivy (1).

Distribution.—Indian and Pacific Oceans, Malay Archipelago.

Remarks.—According to Kinberg this species differs from his *I. ovata* in that it has elytral cilia, whereas his species has not. I do not think that a good specific distinction lies here. Among the present material the larger specimens are darker in colour and have at the outer edge of the scale a number of curious cilia that are beset with spines and small papillæ. These cilia are manifestly modified tubercles. In the smaller specimens the tubercles themselves are little developed and have not grown at the edge into these cilia, the presence of which I believe to be a question of age.

Genus LEPIDONOTUS Leach.

Lepidonotus hedleyi Benham.

Benham, 1915, p. 181, pl. xxxviii. figs. 1-7.

Fauvel, 1932, p. 14.

Occurrence.—Crossland coll., Wasin, British East Africa, 10 fms. (1).

Distribution.—South Australia, Indian Ocean.

Remarks.—This specimen, entirely colourless and without eyes, has large, soft, semi-transparent elytra and looks very unlike a Lepidonotid. The scales are sparsely

dotted with small tubercles having an oval base and an apical ridge, as Benham figures them.

Lepidonotus clava (Montagu).

Fauvel, 1923, p. 46, fig. 16, a-e.

Occurrence.—Crossland coll., St. Vincent Harbour, Cape Verde Islands, shore coll. (8).

Distribution.—Atlantic, Mediterranean, Indian Ocean.

Lepidonotus carinulatus Grube.

Fauvel, 1932, p. 13, with citations.

Occurrence.—Crossland coll., Agig Bay, Red Sea 4½ fms. (1); Wasin, British East Africa, 10 fms. (3).

Distribution.—Red Sea, Indian Ocean, Philippines.

Lepidonotus glaucus (Peters).

Seidler, 1924, p. 79, with citations.

Occurrence.—Crossland coll., Suakim Harbour (4).

Distribution.—Red Sea, Indian Ocean, Malaya.

Remarks.—The elytra vary in colour from pale brown to a pearly grey, and all show a characteristic pair of keels. The species bears a superficial resemblance to *Halosydna striata* (Kinberg).

Genus *HERMENIA* Grube.

Hermenia acantholepis (Grube).

Fauvel, 1932, p. 16, with citations.

Occurrence.—Gardiner coll., Felidu, Maldives (1).

Distribution.—Indian and Pacific Oceans.

Remarks.—Skin rough and wrinkled rather than warty. First pair of elytra large enough to overlap a little in the middle line. Second and third pairs smaller but conspicuous. Remaining scales about half the size of the third pair. Ventral bristles tridentate.

Hermenia verruculosa Grube.

Seidler, 1924, p. 95, with citations.

Treadwell, 1911, p. 9, figs. 23-26.

Monro, 1924, p. 40.

Occurrence.—Gardiner coll., Seychelles, 37 fms. (1); Cargados Carajos, 30 fms. (1).

Distribution.—West Indies, Indian Ocean.

Remarks.—The larger specimen measures 25 mm. by 5 mm. for 24 chaetigers. The skin is both wrinkled and warty.

The first two scales are fairly well developed, but leave a space between them in the median line. The remaining scales are rudimentary, one from the middle of the body measuring about $\frac{1}{3}$ of a mm. in diameter. The ventral bristles (fig. 2) are tridentate, but the third tooth often appears to be lost.

In this species the reduction of the elytra has gone further than in *H. acantholepis*.

Fig. 2.



Hermenia verruculosa Grube. Ventral bristle.

Genus *HARMOTHOË* Kinberg.

Harmothoë fraser-thomsoni McIntosh.

Fauvel, 1923, p. 68, fig. 25, *a-e*, with citations.

Occurrence.—Crossland coll., St. Vincent, Cape Verde Islands, shore coll. (5), and 10 fms. (6).

Distribution.—Atlantic.

Remarks.—I was surprised to find that this species, of which there have been very few records, apparently is a common shore form at the Cape Verde Islands.

Harmothoë flaccida (Potts).

Lagisca flaccida Potts, 1910, p. 339, pl. xviii. fig. 11; pl. xxi. figs. 49 & 50; Fauvel, 1932, p. 21.

Occurrence.—Crossland coll., Wasin, British East Africa, 10 fms. (3).

Distribution.—Indian Ocean, Malay Archipelago.

Remarks.—The best preserved of these specimens has 36 chætigers, of which six lie behind the most posterior pair of scales. Potts gives the number of segments as 38, Fauvel as 40–41, and Horst as 40. The material of this species seen by me seems more properly referable to *Harmothoë* than to *Lagisca*.

Harmothoë waahli (Kinberg).

Augener, 1913, p. 112, pl. ii. fig. 9, with citations.

Monro, 1933, p. 489, figs. 1–3.

Harmothoë atra Horst, 1917, p. 89, pl. xx. figs. 1 & 2.

Harmothoë terminoculata Monro, 1924, p. 42, figs. 5 & 6.

Occurrence.—Crossland coll., Tahiti (3).

Distribution.—Australia, Tahiti, Malay Archipelago, Cape of Good Hope.

Remarks.—The anterior pair of eyes is situated just below the prostomial peaks. The elytra are marmorated with black and lightly fringed. In this species the elytral fringe is sometimes present and sometimes absent.

Genus *LEPIDASTHENIA* Malmgren.

Lepidasthenia elegans (Grube).

Fauvel, 1923, p. 88, fig. 33, *a–g*.

Pruvot, 1930, p. 14.

Occurrence.—Crossland coll., Wasin, British East Africa (3).

Distribution.—Mediterranean, Adriatic, Indian Ocean, Zanzibar, New Caledonia.

Remarks.—These specimens are from the same locality as those attributed by Potts (1910, p. 342) to this species. I believe that the *L. affinis* of Horst from the Malay Archipelago is the same species.

Family *Sigalionidæ*.

Genus *LEANIRA* Kinberg.

Leanira japonica McIntosh.

McIntosh, 1885, p. 154, pl. xxii. fig. 3; pl. xiv. A, figs. 1 & 2.

Fauvel, 1932, p. 33, with citations.

Occurrence.—Crossland coll., Shubuk, Red Sea, 5 fms. (3).

Distribution.—Japan, Malay Archipelago, Indian Ocean, Red Sea.

Remarks.—In these specimens there are three or four superior, ventral, simple, bipectinate chætæ.

Genus *STHENELAIS* Kinberg.

Sthenelais variabilis Potts.

Potts, 1910, p. 349, pl. xix. figs. 22 & 23, pl. xxi. fig. 63.

Horst, 1917, p. 111, pl. xxii. fig. 6.

Occurrence.—Crossland coll., Zanzibar (4).

Distribution.—Indian Ocean, Malay Archipelago, Great Barrier Reef, Cape Verde Islands.

Remarks.—The elytral tubercles are variable in distribution, but are commonly confined to a narrow band at the external border near the cilia and to a wider band at the anterior, concave border. The stylodes carry a number of short, clavate papillæ. The scarcity and localization of the elytral tubercles refer these specimens to Potts's var. *glabra*. The species differs very little from *S. boa* Johnston.

A small specimen from St. Vincent, Cape Verde Islands, from shore, under coral, does not seem to me separable from this species. It measures c. 10 mm. by 1 mm. without the feet for about 60 chætigers. The elytral tubercles are restricted to a small band near the anterior, concave margin. The multi-articulate bristles have only two or three articles.

Family *Chrysopetalidæ*.

Genus *BHAWANIA* Schmarda.

Bhawania cryptocephala Gravier.

Gravier, 1901, p. 263, pl. x. figs. 152-156, text-figs. 280-285.

Fauvel, 1932, p. 43, with citations.

Occurrence.—Crossland coll., Tahiti (3).

Distribution.—Red Sea, Indian and Pacific Oceans.

Remarks.—These are fragments of three individuals. I have retained Gravier's name for this species, because his description is far the most complete, but I believe it to be identical both with Grube's *Palmyra elongata* and with Webster's *Bhawania goodei* (v. Monro, 1933 A, p. 18).

Genus CHRYSOPETALUM Ehlers.

Chrysopetalum ehlersi Gravier.

Gravier, 1901, p. 260, pl. x. figs. 150 & 151, text-figs. 276-278.

Occurrence.—Crossland coll., Red Sea (1); Tahiti, reef at Faaa (1).

Distribution.—Red Sea, Indian Ocean, Tahiti.

Remarks.—Two fragmentary specimens in poor condition. I have again retained Gravier's name for this species, but I think it doubtfully separable either from *C. debile* Grube or from *C. occidentale* H. P. Johnson.

Family Phyllodoceidæ.

Genus PHYLLODOCE Savigny.

Phyllodoce gracilis Kinberg.

Kinberg, 1857, p. 55, pl. xxii. fig. 3.

? Fauvel, 1932, p. 69, text-fig. 12, a-g.

Phyllodoce fakaravana Chamberlin, 1919, p. 108, pl. xvi. figs. 7-12.

Occurrence.—Crossland coll., Tahiti (2); Marquesas (1).

Distribution.—Society Islands, Paumotu Archipelago, Tahiti, ? Andamans, ? Australia.

Remarks.—This is a thread-like Phyllodocid measuring 140 mm. by 1 mm. without the feet for between 600 and 700 chaetigers. The head (fig. 3 a) resembles Kinberg's figure. The proximal part of the proboscis is thickly covered with small, dark, scattered papillæ, and the distal part is smooth. In the anterior region there are narrow intersegmental reddish-brown bands on the back. The cirri are cream-coloured, with small and rather indistinct brown glandular bars around the margin. The tentacular cirri are subulate, and the longest reaches back to about the 10th chaetiger. I find it impossible to be certain whether there is an occipital button in the emargination behind the head. The proboscis is everted and the first two tentacular segments are apparently separate, but more material is necessary to establish this. I can see no bristles in the second tentacular segment. The dorsal cirri (fig. 3 b) are rather small, oval, and symmetrical. They are a little narrower and more lanceolate in the front region than behind (fig. 3 c). The cirrophore is prominent. The bristles are typical, and the ventral cirri extend beyond the foot.

A study of Kinberg's figures leaves me little doubt that these specimens are of his species. The combination of the minute diffuse papillæ on the proboscis, as in

Fig. 3a.

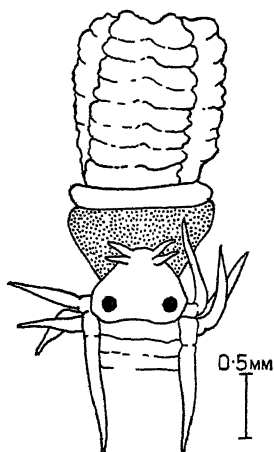


Fig. 3b.

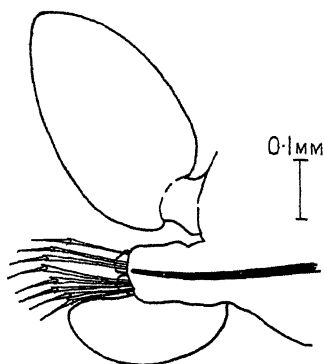
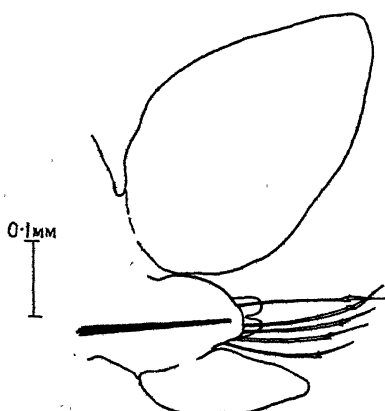


Fig. 3c.



Phyllodoce gracilis Kinberg.

a, anterior end from above ; b, anterior foot ; c, middle foot,

P. laminosa Savigny, with the rather small, symmetrical, dorsal cirri, is distinctive. Fauvel tentatively attributed a specimen from the Andamans to this species. Its

dorsal cirri are rather narrower and more lanceolate than those of my specimens, and he finds bristles in the second tentacular segment. In the shape of the cirri my specimens are nearer to the Australian *P. ovalifera* Augener, which its author considered as doubtfully conspecific with Kinberg's species.

The present specimens were taken with two examples of *Phyllodoce madeirensis* Langerhans, and Crossland has the following note, which may refer to either of the two species:—"Washed from reef-edge material. Anteriorly dorsal cirri white, body with transverse dark green lines. No marks on the dorsal cirri. Posteriorly body light yellow and dorsal cirri a bright yellow. Same locality and habitat; here the yellow of the dorsal cirri extends to the front of the body."

Phyllodoce madeirensis Langerhans.

Fauvel, 1923, p. 150, fig. 53, *d-h*; and 1932, p. 70, with citations.

Occurrence.—Crossland coll., Tahiti (15); Marquesas (1).

Distribution.—Atlantic, Mediterranean, Red Sea, Indian Ocean, Australia, Galapagos.

Remarks.—Most of these specimens are very young forms from the washings. Some are colourless, but the majority show dark dorsal markings anteriorly. These commonly consist of transverse, mid-segmental, dark brown bars that in the median, dorsal line widen out and join up with those of the adjacent segments.

Crossland has the following note on one of the mature specimens:—"Largish, broadest anteriorly. General colour grey-brown dorsally, with bluish-white dorsal cirri. Colour extends throughout the body. Over the general colour are dark transverse lines, two to each intersegment. These are faint over the distended region of the pharynx, but this has blocks of shading in the middle line. Prostomium and tentacles white, two large red eyes. Tentacular cirri also white, except the median on each side, which is dark grey."

Phyllodoce quadraticeps Grube.

Gravier, 1900, p. 198, pl. x. figs. 22-24, text-figs. 56-60.

Fauvel, 1932, p. 68, with citations.

Occurrence.—Fryer coll., Aldabra coast (1).

Distribution.—Red Sea, Indian Ocean, New Caledonia.

Remarks.—This is a long coiled specimen measuring 225 mm. by 2 mm. The colour is brown, with greenish brown cirri, and there are dark purple, segmental, transverse bands across the back. The species is easily recognizable by the short, stumpy, ovoid tentacular cirri.

Phyllodoce marquesensis, sp. n.

Occurrence.—Crossland coll., Marquesas (17).

Description.—A slender, thread-like Phyllodocid measuring up to about 300 mm. by 1 mm. without the feet for 600–700 chætigers. The colour in spirit is pale yellow with dark dorsal markings, which may take the form either of a median stripe or of a series of more or less discontinuous bars and dots. In some the dorsal cirri are splashed with black, and a few show black markings on the tentacular cirri. The head (fig. 4 a) is cordiform and only slightly emarginate behind. There is a pair of large eyes situated in the middle of the head. The tentacles are equal and reach back to the middle of the eyes. The proboscis is diffusely papillated throughout its length, and the papillæ are larger and more crowded in the middle of the proboscis than at its ends. There is a minute occipital papilla. The tentacular cirri are all slender and subulate. The dorsal tentacular cirrus of T. II. is the longest and reaches back to the 8th–10th chætigers. The first and second tentacular segments are probably fused—at any rate they are not clearly separated—but I find it impossible to be certain of their fusion, as their appearance varies a little from specimen to specimen. I find neither bristles nor aciculum in T. II., and T. III. has a ventral aciculum but no bristles. I have dissected out the tentacular region in only two specimens. The dorsal cirri (fig. 4 b) are upright, oval, and laterally inserted. In the middle and hinder regions they are broader and less elongate than in front (fig. 4 c). The foot has two lips, one of which is clearly bilobed. The ventral cirri are large and reniform. The bristles (fig. 4 d) are typical and show nothing distinctive. The body ends in a pair of short, clavate cirri.

Remarks.—The presence of small diffuse papillæ throughout the length of the proboscis, an arrangement resembling that in *Eulalia viridis*, and the oval, laterally inserted,

Fig. 4a.

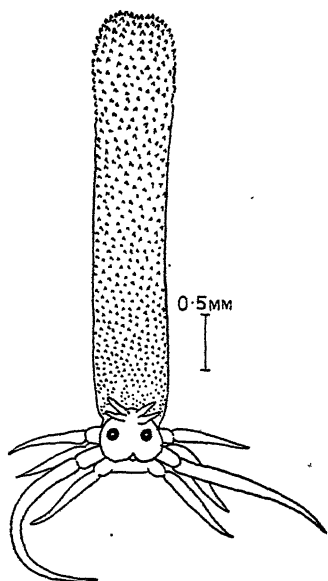


Fig. 4b.

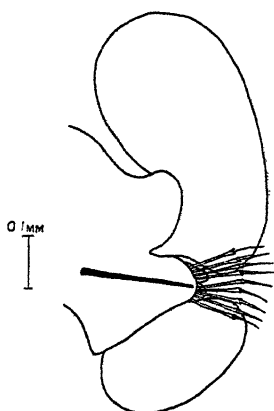


Fig. 4d.

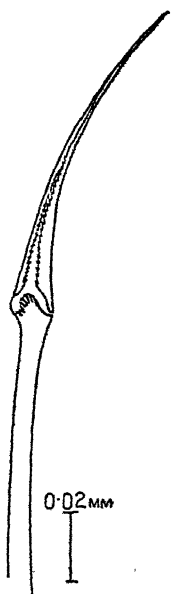
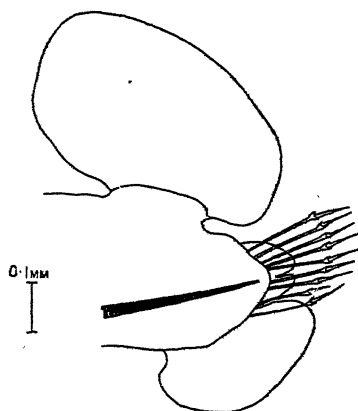


Fig. 4c.



Phyllodoce marquesensis, sp. n.

a, anterior end from above ; b, anterior foot ;
c, middle foot ; d, bristle.

dorsal cirri are unlike those of any other *Phyllodoce* known to me.

If my account of the tentacular segments is correct, this species does not fit into any of the genera as defined by Bergström. It comes nearest to *Genetyllis* Malmgren, but according to Bergström *Genetyllis* has bristles in both T. II. and T. III., from which segments they appear to be absent in the present material. Moreover, the representatives of Malmgren's genus with which I am familiar, *G. castanea* and the antarctic *G. polyphylla*, are much shorter and stouter worms and have an entirely different facies from that of the present species, and it is better, for the present at any rate, to assign the species to *Phyllodoce*.

Phyllodoce tahitiensis, sp. n.

Occurrence.—Crossland coll., Tahiti (3).

Description.—This is a small species, an average measurement being about 35 mm. by 1 mm. for c. 160 chætigers. The body colour is pale yellow and there are no markings. The head (fig. 5a) is cordiform, slightly emarginate behind. There is a minute occipital papilla. There is a pair of large eyes in the hinder part of the head. The tentacles do not reach back as far as the eyes. The proximal part of the proboscis has six rows of small papillæ on each side. The distal part has corrugations but no papillæ. The longest tentacular cirrus, the dorsal cirrus of T. II., reaches back to the 8th chætiger. I have not attempted, on the material, to discover the tentacular formula, but T. I. and T. II. are difficult to separate. In the anterior region the dorsal cirri (fig. 5b) are cordiform and symmetrical, the feet have one of the lips bilobed, the ventral cirri are more or less reniform and extend beyond the ends of the feet, and the bristles (fig. 5c) are typical. In the middle and hinder regions the dorsal cirri are more slender and lanceolate, the ventral cirri are relatively longer and have pointed ends, and the bristles (fig. 5d) are modified. The head of the shaft is beak-like and bidentate and the end-pieces are short.

Remarks.—The arrangement of the papillæ on the proboscis recalls that in *P. madeirensis*, and refers this species to *Anatitides*. The symmetrical, cordiform, dorsal

Fig. 5 a.

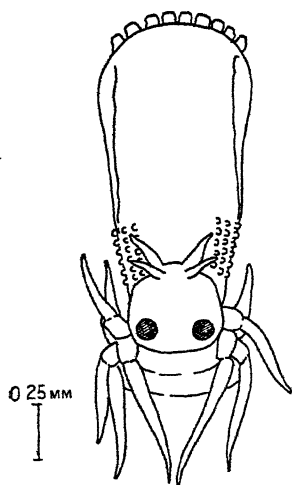


Fig. 5 b.

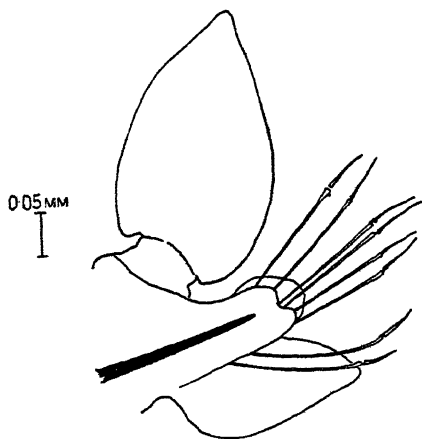


Fig. 5 c.

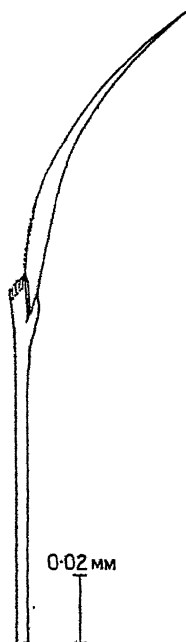
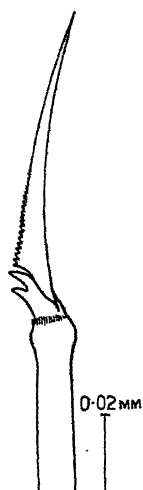


Fig. 5 d.



Phyllodoce tahitiensis, sp. n.

a, anterior end from above (occipital papilla not shown); b, anterior foot; c, anterior bristle; d, modified bristle from middle region.

cirri are not distinctive, but the bidentate bristles are unlike those of any *Phyllodoce* known to me. In *Eulalia*, however, a similar bristle is known, for Hartman figures one for her *Eulalia aviculiseta* from California (Hartman, 1936, fig. 6).

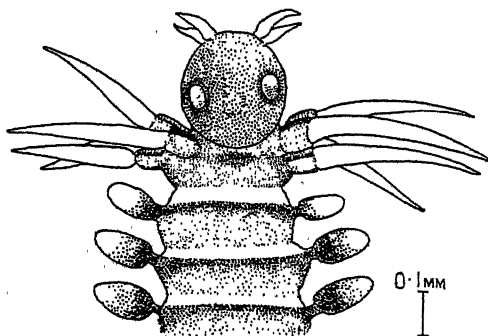
The species present has affinities with *Phyllodoce erythrænsis* Gravier from the Red Sea. The cirri are similar, and Gravier's species also has modified bristles in the hinder region, but of a different form. Moreover, Gravier records papillæ on the distal part of the proboscis.

Phyllodoce melæna, sp. n.

Occurrence.—Crossland coll., Tahiti (1).

Description.—This is a minute Phyllodocid, incomplete posteriorly, and measuring 10 mm. by 0.5 mm. for 40

Fig. 6 a.



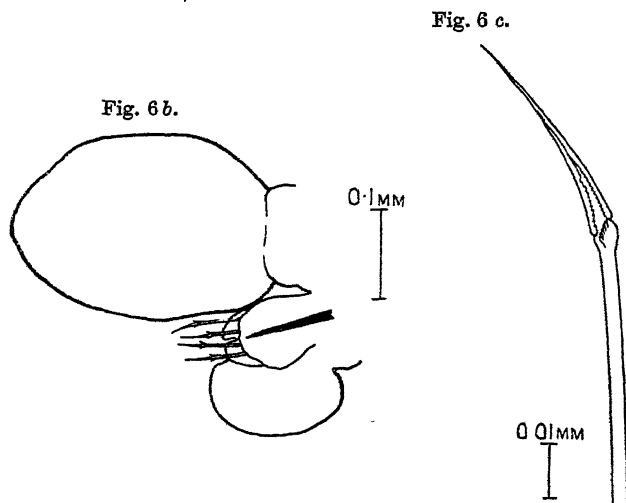
Phyllodoce melæna, sp. n.

a, anterior end from above.

chaetigers. The head is black, and across the back there are broad black segmental bands occupying more than half the segment. These become gradually a little narrower from before backwards. The cirrophores of the tentacular cirri are black, and also the dorsal cirri, except towards the tip. The head (fig. 6 a) is oval, longer than broad, and not emarginate behind. I can see no occipital button. There is a pair of eyes in the middle of the head, almost concealed by the black pigment. The proboscis is withdrawn, and I have not attempted a dissection. The tentacular cirri are all more or less equal and rather short, the dorsal cirrus

of T. II. reaching back only as far as the 3rd chaetiger. The tentacular segments appear to be separate. The dorsal cirri (fig. 6 *b*) are ovate and symmetrical, the feet have one of the lips bilobed, and the ventral cirri are oval. They are devoid of pigment. The bristles (fig. 6 *c*) are typical.

Remarks.—I have established a new species for this small Phyllodocid, which cannot, without further material, be completely described. The oval head, without a



Phyllodoce melsæna, sp. n.

b, middle foot; *c*, bristle.

posterior emargination, the ovate dorsal cirri, and, above all, the very distinctive colour-pattern, are a combination of characters distinguishing it from any other Phyllodocid that I know. It may be the young form of one of the familiar tropical species.

Phyllodoce (Genetyllis) castanea (Marenzeller).

Carobia castanea Marenzeller, 1879, p. 127, pl. iii. fig. 2.

Phyllodoce castanea Fauvel, 1932, p. 68, with citations.

Occurrence.—Crossland coll., Red Sea (1).

Distribution.—Red Sea, Indian Ocean, Pacific.

Remarks.—The head is damaged, but it has a rounded shape. The body-colour is pale yellow, and the large,

cordiform, dorsal cirri are a deep reddish brown. This species has a characteristic appearance.

Genus *EULALIA* Oersted.

Eulalia tenax Grube.

Monro, 1937, p. 266, with citations.

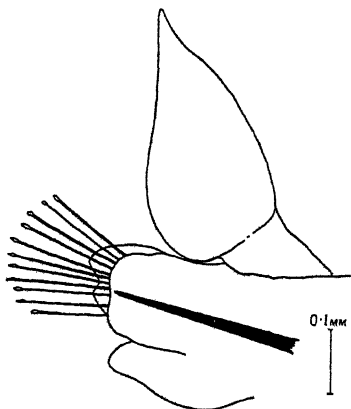
Eulalia magalhaensis Fauvel, 1919, p. 364, fig. iii.; nec Kinberg.

Occurrence.—Crossland coll., Dongonab Harbour, Red Sea (1).

Distribution.—Red Sea, Indian Ocean, Australia.

Remarks.—The colour in spirit is pale yellow. The tentacles are as long as the head, the tentacular segments are separate. Ventral cirrus of second tentacular segment flattened. Dorsal cirri slender, lanceolate.

Fig. 7.



Eulalia albopicta Marenzeller. Foot.

Eulalia albopicta Marenzeller.

Marenzeller, 1879, p. 128, pl. iii. fig. 3.

Fauvel, 1932, p. 71.

Occurrence.—Crossland coll., Wasin, British East Africa (5).

Distribution.—Japan, Nicobar Islands, Zanzibar.

Remarks.—I have great hesitation in attributing these specimens to Marenzeller's species. They are long and slender and measure about 125 mm. by 2 mm. without the feet. The colour in spirit is grey, with whitish transverse bars across the back. The tentacular

segments are clearly separate. The ventral cirrus of the second tentacular segment is not flattened. The dorsal cirri (fig. 7) are slenderly cordiform and have unusually long and pointed tips. Even in the anterior region they are much narrower at the base relatively to their length than as figured by Marenzeller.

The present specimens agree to some extent with the accounts of Marenzeller and Fauvel, but they are much larger, c. 125 mm. in length as against about 20 mm. On the other hand it is not clear that Marenzeller's or Fauvel's specimens were complete. The dorsal cirri are also rather different, but only in the relation of the length to the breadth, a type of variation that often is found within the species in the Phyllodocids. In other respects the specimens agree well enough with the accounts. The attribution remains doubtful.

Eulalia punctifera Grube.

Fauvel, 1923, p. 165, fig. 59, *a-d*, with citations.

Occurrence.—Crossland coll., Zanzibar (1).

Distribution.—English Channel, Atlantic, Mediterranean.

Remarks.—A single specimen in poor condition and broken into a number of pieces. It measures about 1 mm. in width without the feet. I am unable to separate it from the European species. It has typical colour-markings. There are a pair of black dots in front of the eyes and round, black patches on all the dorsal cirri. In the anterior region only there is a small black patch on the ventral cirri. T. I. and T. II. are inseparable dorsally. The dorsal cirri are cordiform and symmetrical. The pedal lobes are unusually long and have pointed bilobed tips.

As far as I know, this species has never before been recorded outside European waters. The material is poor, and I had much hesitation in attributing this Indian Ocean specimen to *E. punctifera*; but within the limits of the material I am unable to make a distinction.

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XII.—*Descriptions and Records of Bees.*—CLXXV.

By T. D. A. COCKERELL, University of Colorado.

THE bees recorded below will be found in the British Museum.

Nomia nubecula Smith.

Cameroons : Victoria, 1916–1917 (*F. H. FitzRoy*).

I examined Smith's type (from Sierra Leone), and noted: apex of fore wing with a very large dark reddish-fuliginous area; second cubital cell very high and narrow, recurrent nervure meeting intercubitus; third cubital cell very deep and comparatively short; stigma large, rufo-fulvous; first tergite strongly shining; apical depressions of tergites very short, almost linear, covered with light fulvous hair. A specimen from Entebbe, placed here in the Museum, represents a different species.

Halictus atelopterus Cockerell.

♂.—Length 5–5.5 mm.

Black, with the mandibles variably reddish, flagellum obscurely brownish beneath, tegulæ dark reddish brown, small joints of tarsi reddish; very like the female *H. atelopterus*, with the same shining mesonotum and scutellum, white hair on head and thorax, and milky-white wings, with the outer recurrent and intercubitus practically obsolete. It differs in being considerably less robust, with narrower abdomen, the second tergite having on its basal half (more than half in middle) a broad saddle of pale grey tomentum, while the third has a basal band of the same, narrowly interrupted in middle. The area of metathorax has irregular plicæ, resembling branches of trees. The antennæ are short, as in a female. The abdomen has a rounded black apical plate. In 'African Bees' (1937), p. 80, I give a table to separate the species with a saddle-like band of tomentum on second tergite. All are males, and it now appears probable that the character is confined to that sex. The short male antennæ do not define the group, as *H. percornutus* Ckll. has very long antennæ. At Greytown, Natal, Oct. 1931, we took both sexes of *H. atelopterus*; I have no hesitation in associating the males with this

species, notwithstanding the conspicuous difference in the ornamentation of the abdomen.

Halictus albolineolus Meade-Waldo.

♂.—Length about 6.6 mm.; anterior wing 5.

Black, including mandibles, labium (which is binodose), and clypeus; tegulae reddish brown; legs dark brown, hind basitarsi beneath with a dense shining white fringe; hair of head and thorax long but not dense, dull white, a fringe of reddish hair below labrum; head about as broad as long; clypeus not much produced, flattened, shining, with scattered punctures, and a median pit; supraclypeal area dullish, contrasting with clypeus; front and vertex dull; antennae reaching to base of wings, the flagellum thick, the joints swollen and faintly brownish beneath; mesonotum and scutellum dull, very minutely punctured, the scutellum with a median depression; area of metathorax large, dull, appearing granular under a lens, but the microscope shows very numerous parallel slender striae; posterior truncation small, dull, poorly defined at sides. Wings hyaline, the apical margin slightly dusky; stigma dark reddish, nervures brown; outer nervures distinct; second cubital cell receiving recurrent nervure near middle or well before end. Abdomen slender, claviform, slightly brownish, without hair-bands or spots, but tergites 1 to 4 with linear apical white tegumentary bands; venter brown.

S. Rhodesia: Vumba, Umtali, May 23–26, 1932 (J. Ogilvie).

Related to *H. kivuicola* Ckll. from Katanga, but distinguished by the abdominal bands. *H. tinctulus* Ckll. has much broader, pale orange bands. *H. zacephalus* Ckll., which has bands like those of *H. albolineolus*, has a very peculiar elongate head.

I had described this as a new species, but I am convinced that it is the insect which Cameron labelled "*Paranomia albolineola*," the type, from the Transvaal, being in the British Museum. It was briefly published by Meade-Waldo in *Ann. & Mag. Nat. Hist.*, June 1916, p. 450, but the above is the first real description. As Cameron gave no description, the name is properly credited to Meade-Waldo, who mentioned a few characters.

Halictus sculptissimus, sp. n.

♂.—Length about 5 mm., anterior wing 4.3.

Black, with a long highly polished claviform abdomen, narrow at base; head broad; clypeus with a very broad pale yellow band, which has a little projection upward on middle line; labrum yellow; mandibles yellow, rufescent at end; clypeus shining, with little hair; supraclypeal area dullish, not hairy; sides of face covered with appressed white hair; vertex shining; antennæ very long, reaching metathorax, the flagellum ferruginous beneath; tubercles with a small yellow spot; mesonotum shining, with a median groove; area of metathorax dull, shining apically; tegulæ brown. Wings clear hyaline; stigma large, dusky reddish; nervures pale; second cubital cell broad, receiving recurrent nervure at apical corner; outer nervures distinct. Femora and tibiæ mainly ferruginous, but the hind femora dusky beneath and black behind except at extreme ends, the middle and hind tibiæ black on outer side except at ends; tarsi cream-colour, the hind ones very long. Abdomen without spots or bands, the extreme apex (to be seen from beneath) light red.

S. Rhodesia: Matopo Hills, April 17–30, 1932 (*J. Ogilvie*).

Resembling *H. windhukensis* Friese, but that has entirely dark antennæ and comes from S.W. Africa. It has black legs and no yellow band on clypeus. A larger specimen of *H. sculptissimus*, with abdomen broader at base and the very long flagellum clear reddish orange beneath, is from Shangani, De Beers Ranch (*L. Ogilvie*).

Halictus levibasis, sp. n.

♂.—Similar in most respects to *H. sculptissimus*, and at first taken for a second specimen of that species, but differing thus: clypeus narrower at end, the band much shorter; no conspicuous white hair at sides of face; flagellum dusky red beneath; stigma and veins darker, second and third cubital cells narrower. Legs black, with the tarsi cream-colour. Abdomen less swollen apically, more parallel-sided, and with no red spot at apex.

S. Rhodesia : Matopo Hills, April 17–30, 1932 (*Alice Mackie*).

The microscope shows that the two species differ radically in the sculpture of the thorax. In *H. sculptissimus* the scutellum (but not the axillæ), postscutellum, and area of metathorax have very strong and coarse longitudinal plicæ, which are lacking in *H. levibasis*. The latter species has the dull area of metathorax quite without sculpture. There is a rather close resemblance to *H. thestis* Cam.

Halictus perileucus Cockerell & Ireland.

Males from Shangani, De Beers Ranch, S. Rhodesia, May 8–12, 1932 (*J. Ogilvie*), and Matopo Hills, April 17–30 (*J. Ogilvie*).

Halictus windhukensis Friese.

Male, National Park, Natal, March 3–15, 1932 (*L. Ogilvie*).

Halictus deceptus Smith.

Cape Province : Kirstenbosch, Nov. 18, 1933 (*L. Ogilvie*).

Halictus calvini Cockerell.

Cape Town : Lion's Head, Oct. 29, 1933 (*J. Ogilvie*).

Female ; differs from *H. volutatorius* Cam. by the area of metathorax bounded behind by a very thick, shining rim, depressed in middle, and the hair of face and front all dull white. The first tergite is red, dark only at base.

Halictus albosellatus Cockerell.

Cape Province : Bot River, Nov. 10, 1933, male (*J. Ogilvie*).

Halictus gastrophilinus, sp. n.

♂.—Length about 7.3 mm., wings unusually short, about 4.3.

Black, closely resembling *H. pulchrinitens* Ckll., to which it runs in the table in 'African Bees,' p. 80, but differing thus : larger, but with shorter wings ; mandibles black ; flagellum not reddened apically, the short joints strongly swollen beneath ; basitarsi black, but small

joints bright ferruginous; second cubital cell broad; saddle-like patch on basal part of second tergite greyish white; no patches of light tomentum on third tergite. Otherwise the description of *H. pulchrinitens* applies. Tegument of clypeus all black; tongue dagger-like, the end very slender; wings clear hyaline, somewhat milky; stigma rather dark reddish brown.

Cape Province: Bot River, Nov. 10, 1933 (*L. Ogilvie*).

Halictus michaelsoni Friese.

Cape Province: Mafeking, Feb. 27 to March 1, 1934, 7 ♀, 2 ♂ (*J. Ogilvie*).

The male has a round head; apical half of the long mandibles red; antennæ short for a male, the flagellum brown beneath, the short joints swollen; tegument of clypeus all black; a deep pit in middle of clypeus; mesonotum moderately shining, scutellum strongly so; tegulæ red; stigma pale, with a dusky margin; area of metathorax dull and rugulose, shining apically (all dull in female); legs black, the tarsi red apically; tergites with thin basal hair-bands. Friese remarks on the resemblance of the female to the European *H. leucozonius*. The male differs from *H. leucozonius* in many ways, such as the black clypeus and legs and shorter antennæ. It has no saddle-like patch of tomentum on second tergite. A female comes from Palapye Road, Bechuanaland, March 6 (*J. Ogilvie*); and there is a male (more robust than those from Mafeking) from Norval's Pont, North Bank Halt, Orange Free State, April 14 (*J. Ogilvie*).

Halictus michaelsoni angusticaudus, subsp. n.

♀.—Agrees with *H. michaelsoni* in almost all respects, but formed like a male, with slender abdomen about 2.5 mm. broad (instead of 3 mm.), the margins of the first three tergites conspicuously rufescent; head much smaller and thorax less robust; anterior wing 5.6 mm. long (instead of 6.1).

Cape Province: Uitenhage, Oct. 30, 1931 (*A. Mackie*).

There is only one specimen, but it seems to be quite a distinct race. The sculpture of the metathoracic area does not differ. The locality is about 170 feet above sea-level.

Halictus placatus Cockerell.

Cape Province : Mafeking, Feb. 28 to March 1, 1934, 9 ♀, 2 ♂ (*J. Ogilvie*).

When describing *H. placatus* from the female I commented on its close resemblance to *H. pernotescens* Ckll., known from the male. The discovery of the male *H. placatus* shows that it is indeed near to *H. pernotescens*, having the flagellum long, light orange-fulvous beneath, with the last two joints black. It differs, however, by the entirely white hair of head and thorax, the much clearer wings, and the red tegulæ. The clypeus is entirely black.

Halictus shanganiensis Cockerell.

Orange Free State : females from Donkerpoort, April 18, 1934, and Afdeling Farm, Bosrand, March 30, 1934 (*J. Ogilvie*).

Halictus tenuicinctus, sp. n.

♀ (type).—Length 5–6 mm., anterior wing nearly 4.

Head and thorax black ; legs black or slightly brownish, the tarsi somewhat pallid ; abdomen rather narrow, very dark brown, with hind margins of tergites 2 to 4 cream-colour, and the extreme base of 3 and 4 margined with the same ; hair of head and thorax very scanty, greyish white, with no pale band between mesonotum and scutellum ; head broad, nearly circular, the clypeus little produced ; mandibles red except at base ; clypeus short, shining, with distinct punctures ; supraclypeal area small and dull ; front and sides of face shining ; apical half of flagellum red beneath ; mesonotum slightly shining, finely punctured, with a distinct median groove ; scutellum shining, not depressed in middle ; area of metathorax very large, entirely dull, with two small shining points, not conspicuous, on hind margin ; under the microscope the area shows excessively dense minute punctures, forming a sort of extremely minute tessellation, with no plicæ ; tegulæ testaceous, darker on inner side ; wings hyaline, stigma large, reddish brown ; nervures pale, outer intercubitus and recurrent very weak ; second cubital cell small, receiving recurrent nervure near apical corner ; hind spur with two long spines near base (rather style of *H. percinctus* Ckll.) ; abdomen shining, thinly hairy, without distinct hair-bands or spots.

♂.—Length about 5 mm.

Abdomen long and very slender, a rather strong constriction at base of second tergite, third and fourth tergites with linear apical pale bands; head broad, orbits strongly converging below; a transverse very pale yellowish mark at apex of clypeus; mandibles pale yellow, red at apex; face and front with white hair; antennæ very long, reaching to end of thorax, the flagellum entirely light red beneath; legs black, with the basitarsi cream-colour and small joints of tarsi brown.

Cape Province: Mafeking, March 1, 1934, 2 ♀, 1 ♂ (*J. Ogilvie*).

The female may be compared with *H. transiens* Cameron, from Grahamstown, which has the flagellum brown beneath and the front dull. The male is very like *H. thestis* Cameron, from Stellenbosch, but that is smaller and does not have the linear bands on abdomen. It is also very like *H. levibasis* Ckll. from S. Rhodesia, but that has a shining pure black abdomen, without bands, and larger and darker tegulæ.

Halictus pachyacanthus Cockerell.

Cape Province: Bot River, Nov. 10, 1933 (*J. Ogilvie*).

Halictus norvali, sp. n.

♀.—Length about 8 mm., anterior wing a little over 6.

Black, robust, the long stout mandibles obscurely reddish in middle, the short flagellum with the apical half ferruginous beneath, the tegulæ almost black, but reddish in middle, and with a hyaline border; hair of head and thorax greyish white, thin but conspicuous on face, cheeks, mesonotum, and scutellum; head circular seen from in front; clypeus broad and short, shining, with distinct well-separated punctures, the apical middle with a longitudinal pit; front dull, not polished along orbits, but there is a broad shining band from each lateral ocellus obliquely downward to the orbit; mesonotum finely punctured, somewhat shining but not polished, median groove distinct; scutellum bigibbous, the elevations shining; area of metathorax large, entirely dull, the fine striæ hardly visible under a lens; the microscope shows very fine wrinkles covering the whole surface, which thus has a minutely reticulate

appearance; posterior truncation sharply defined at sides. Wings hyaline, stigma pale fulvous, nervures very pale, outer intercubitus and recurrent evanescent; first recurrent nervure meeting second intercubitus. Legs black, the small joints of tarsi red; hair on inner side of basitarsi pale orange; hind spur of the type of *H. deceptus*. Abdomen broad, first tergite with a median band of white hair, evanescent in middle; tergites 2 to 4 with broad dense basal bands of dull white tomentum, that on fourth broader than the black part beyond; hair at sides of caudal furrow greyish.

Orange Free State: North Bank Halt, Norval's Pont, April 14, 1934, 2 ♀ (*J. Ogilvie*).

An ordinary-looking species, with a general resemblance to *H. shanganiensis* Ckll., but easily separated by the longer area of metathorax, without the distinct plicæ. From *H. deceptus* Smith it is known by being smaller and less robust, with the punctures on mesonotum smaller and less distinct, the third cubital cell narrower above, and the clear hyaline wings.

XIII.—*A new Subspecies of Vole from Turkestan.*

By V. G. HEPTNER.

Microtus (Chionomys) nivalis dementievi, subsp. n.

Type.—N.S. 27579, Orig. N. 5 a, 28. xi. 1936. Mt. Dushak, near Ghermab, Kopet-Dagh Mts., Transcaspiæ, 7000 ft. Skin and skull in the Zoological Museum, Moscow University.

Diagnosis.—*Ch. n. dementievi* belongs to the group of subspecies with five loops on the third upper molar* and with bullæ osseæ relatively large and rather swollen; it is characterized by the upper parts of a very pale and light colour of a dull brownish sandy tint. The dark basal parts of hairs distinctly visible on belly, which is tinted grey. The demarcation line between the colours of the under and the upper part of body is distinct,

* Subspecies of the group *Chionomys gud* Sat. (a distinct species?), from the main Caucasus range and in the extreme north-eastern part of Turkey (Trebizond region), have seven loops on M.3. Forms with five loops on M.3 are absent from the main Caucasus range, but occur in the mountains of Transcaucasia.

though not sharp. Tail uniformly white both above and below. Fore and hind feet white above. The tooth-row is relatively heavy.

Measurements.—Head and body 115, tail 55, hind foot 18, ear 15 mm.

Condyllo-basal length of the skull 27.6; zygomatic breadth 15.9; nasal bones length 8.2; interorbital constriction 4.4; upper molar series (alveoli) 6.2; greatest length of bulla (incl. *pars mastoidea*) 10.3 mm.

Representatives of the subgenus *Chionomys* have not yet been recorded from Turkestan. The eastern limit of range of this species, as far as known, appeared to have been the eastern part of the main Caucasus range. The discovery of this species in Kopet-Dagh * extends further eastward the limits of its distribution, as well as that of the whole *Chionomys* group. This discovery and the occurrence of *Chionomys* in Asia Minor permit us to suggest that these voles are probably widely distributed in Persia, at least in its northern region. In particular, there can be little doubt in regard to *Chionomys* inhabiting the Elbourz mountain range.

The new subspecies is dedicated to Mr. G. P. Dementiev, curator of birds of the Zoological Museum, Moscow University.

XIV.—*Neue Staphyliniden (Coleoptera) aus Neu-Seeland.*

Von Dr. MAX BERNHAUER, Horn, Nieder-Donau.

UNTER dem mir von Herrn Gilbert J. Arrow zur Bearbeitung übergebenen Staphyliniden-Material des British Museum befanden sich auch eine grössere Anzahl von neuseeländischen Arten, die aus den Ausbeuten der Herren Broun und Helms stammen. Einige wenige weitere Tiere befanden sich seit Jahren in meiner Sammlung, die ich von verschiedenen anderen Seiten erhielt. Ich spreche Herrn Arrow meinen geziemenden Dank für das bei jeder Gelegenheit bewiesene freundliche Entgegenkommen bei Unterstützung meiner Arbeiten

* It has been already recorded by M. Laptev (1936) and, so far as I know, specimens of this form were found somewhat earlier near Gaudan, in Kopet-Dagh.

aus und lasse nunmehr die Beschreibung der im Material vorgefundenen neuen Arten folgen, deren Typen sich, wo nichts anderes erwähnt ist, im British Museum und in meiner eigenen Sammlung befinden.

OMALIUM Grav.

STENOMALIUM, subgen. nov.

Die neue Untergattung unterscheidet sich von *Omalium* s. st. durch die schmale Gestalt und die stärker verdickten Fühler, besonders durch das verbreiterte, das fünfte Glied an Breite stark übertreffende und stark quere sechste Glied. In letzterem Punkte ist diese Untergattung dem Genus *Phlaezonomus* sehr ähnlich, mit welchem sie auch die Bildung der Hintertarsen gemeinsam hat. Durch die in der Mittellinie fein gekielte Mittelbrust ist sie jedoch zu *Omalium* zu stellen. Das letzte Glied der Hintertarsen ist viel länger, als die kurzen vier ersten Glieder zusammen genommen. Im Habitus ist die neue Untergattung den Arten der Gattung *Phyllodrepa* recht ähnlich, unterscheidet sich jedoch von ihr durch das gekielte Mesosternum, die Bildung der Fühler und Hintertarsen hinlänglich.

Omalium (Stenomalium) rufiventre, sp. n.

Gelbrot der Kopf und der Halsschild meist rötlich-braun, die Flügeldecken schwärzlich, ihre Basis in der Regel breit rötlichgelb, die fünf ersten Glieder der im Übrigen dunkelgefärbten Fühler rotgelb, die Beine heller rötlichgelb. Der Kopf ist schmaler als der Halsschild, vor den Ocellen mit einem winzigen Grübchen, vorn geglättet mit zwei kurzen Längsfurchen, sonst wenig fein und mässig dicht punktiert, ziemlich glänzend. Die Fühler vom sechsten Glied angefangen keulig erweitert, das sechste Glied stark quer, die vorletzten doppelt so breit wie lang. Der Halsschild ist schmaler als die Flügeldecken, fast um die Hälfte breiter als lang, etwas vor der Mitte der Seiten gerundet erweitert, nach vorn stark, nach rückwärts schwächer, fast geradlinig verengt, an den Seiten hinter der Mitte mit einem runden Grübchen, vor dem Hinterrande mit zwei Längsgrübchen, ziemlich kräftig und mässig dicht punktiert, ziemlich glänzend. Die Flügeldecken sind mehr als

doppelt so lang wie der Halsschild, viel länger als zusammen breit, ähnlich wie dieser, nur etwas dichter punktiert, ziemlich glänzend. Hinterleib ziemlich glänzend, sehr fein und wenig dicht punktiert. Länge: 2.2–2.5 mm.

PICTON (*Helms*); AUCKLAND.

Omalium (Stenomalium) cottieri, sp. n.

Von der vorhergehenden Art durch grössere, etwas breitere Gestalt und viel gröbere und weitläufigere, auf den Flügeldecken, in deutlichen Reihen angeordnete Punktierung und hellere Färbung leicht zu unterscheiden.

Hellrötlichgelb, glänzend, der Hinterleib vor der Spitze geschwärzt, die Fühler mehr rostrot. Der Kopf viel schmaler als der Halsschild, mit zwei ziemlich tiefen Stirnfurchen, zwischen diesen ziemlich stark gewölbt, kräftig und weitläufig punktiert, vorn geglättet, Fühler kräftig, das sechste Glied stark quer, doppelt so breit wie das fünfte, die vorletzten fast doppelt so breit wie lang. Halsschild schmaler als die Flügeldecken, um ein Drittel breiter als lang, an den Seiten nur mässig erweitert, in der Mitte am breitesten, nach rückwärts geradlinig und mässig stark, nach vorn stärker verengt, neben den Seiten auf der hinteren Hälfte mit einem grossen, tiefen Eindruck, neben der Mitte auf der rückwärtigen Hälfte mit je einer breiten und tiefen Längsfurche, kräftig und weitläufig punktiert, stark glänzend, mit geglätteter Mittellinie. Flügeldecken ungefähr doppelt so lang wie breit, nach rückwärts etwas erweitert, stark und weitläufig, deutlich in regelmässigen Reihen punktiert. Hinterleib mässig fein und dicht, längs der Mittellinie weitläufiger punktiert, mässig glänzend. Länge: 3 mm.

NORTH ISLAND: Palmerston, 31. x. 1930 (*W. Cottier*).

Omalium (Stenomalium) parkeri, sp. n.

Dem *rufiventre* ähnlich, aber durch andere Färbung, breiteren Kopf und verschiedene Skulptur, insbesondere der Flügeldecken leicht zu unterscheiden.

Schmutzig rötlichgelb, mässig glänzend, der Kopf etwas dunkler, die Umgebung des Schildchens und ein grosser Fleck in den Hinterecken der Flügeldecken, welcher sich bis in die Nähe der Naht erstreckt, schwärzlich, die fünf ersten Glieder der im Übrigen schwarzen Fühler und

die Beine rötlichgelb. Der Kopf ist grösser als bei den vorherigen Arten, nur mässig schmaler als der Halsschild, vor den Ocellen mit je einem scharfen Längsgrübchen, vorn mit zwei schwachen Längsfurchen, ziemlich kräftig und weitläufig, vorn noch spärlicher punktiert. Die Augen mässig vorstehend, Schläfen wohl entwickelt, etwa halb so lang wie der Längsdurchmesser der Augen, während sie bei den vorherigen Arten nur sehr kurz und flacher verrundet sind. Fühler vom sechsten Glied an keulig verdickt, das erste Glied erweitert, länger als die beiden folgenden zusammengekommen, das dritte so lang, aber nur halb so dick wie das zweite, die beiden folgenden klein, mässig quer, das sechste doppelt so dick wie das fünfte, stark quer, die folgenden ziemlich gleich gebildet, die vorletzten bei breitester Ansicht um mehr als die Hälfte breiter als lang, das Endglied rundlich, gegen die Spitze verjüngt, etwas länger als die beiden vorhergehenden zusammengekommen. Halsschild schmaler als die Flügeldecken, fast um die Hälfte breiter als lang, nach rückwärts ziemlich stark, etwas ausgeschweift verengt, die Eindrücke tiefer und länger als bei *rufiventre*, die Punktierung etwas schwächer und weitläufiger, teilweise in einander fliessend. Flügeldecken mehr als doppelt so lang wie der Halsschild, nach rückwärts wenig verbreitert, stärker und etwas weniger dicht als bei *rufiventre*, stellenweise in deutlichen Reihen punktiert. Hinterleib fein und weitläufig punktiert, weniger glänzend als der Vorderkörper. Länge: 2.2 mm.

NORTH ISLAND (*R. N. Parker*).

Phyllodrepa apicalis, sp. n.

Omalium apicale Fauvel, in litt.

Durch die Färbung leicht kenntlich. Einfarbig lebhaft rostgelb, die Flügeldecken gegen die Hinterecken zu in der Regel unbestimmt dunkler, die Fühler, Taster und Beine rötlichgelb. Kopf beträchtlich schmaler als der Halsschild, fast länger als mit den Augen breit, vor den Ocellen mit je einem kleinen Grübchen, vorn mit zwei mässig tiefen Längseindrücken, zwischen ihnen ziemlich geglättet, rückwärts mässig stark und mässig dicht punktiert. Schläfen deutlich entwickelt, nur wenig

kürzer als der von oben sichtbare Längsdurchmesser der Augen. Fühler ziemlich kurz, gegen die Spitze verdickt, das dritte Glied viel schmaler und auch kürzer als das zweite, das vierte und fünfte quer, das sechste viel breiter und stärker quer als das fünfte, die vorletzten fast doppelt so breit wie lang. Halsschild viel schmaler als die Flügeldecken, nur mässig breiter als lang, vor der Mitte stark erweitert, nach rückwärts ziemlich stark und fast etwas aus geschweift verengt, vor dem Schildchen mit zwei ziemlich kurzen, breiten Längseindrücken, in der Mitte der Seiten mit je einem breiten und ziemlich starken Schrägeindruck, welcher sich bis gegen die Hinterecken erstreckt, ziemlich kräftig und wenig dicht punktiert, glänzend. Flügeldecken schmal, nicht ganz, doppelt so lang wie der Halsschild, viel länger als zusammen breit, mässig stark und mässig dicht punktiert, glänzend. Hinterleib matt chagriniert, sehr fein und mässig dicht punktiert. Mittelbrust ungekielt, das letzte Glied der Hintertarsen etwas länger als die vier vorherigen zusammen. Länge: 2-2.3 mm. Von der sehr ähnlichen *Ph. (Omalium) antipodum* Broun durch kräftigere, weitläufigere Punktierung und in der Regel längere Flügeldecken verschieden.

GREYMOUTH (*Helms*) ; PICTON (*Helms*).

Phyllodrepa sharpi, sp. n.

Omalium sharpi Fauvel, in litt.

Eine durch die dichte rauhrunzelige Skulptur des Vorderkörpers sehr ausgezeichnete dunkle Art, die auch durch breiteren Kopf von der vorhergehenden Art abweicht.

Pechschwarz, wenig glänzend, die Beine schmutzig rötlichgelb. Der Kopf ist nur mässig schmaler als der Halsschild, quer, vor den Ocellen mit je einem winzigen Grübchen, hinter dem Vorderrand mit zwei sehr kurzen, scharfen und schmalen Längsfurchen, oben ziemlich gleichmässig flach gewölbt, ziemlich kräftig und dicht rauhrunzelig, vorn nur einzeln punktiert, ziemlich matt. Die Schläfen sind sehr klein, kaum ein Viertel so lang wie der von oben sichtbare Längsdurchmesser der ziemlich gewölbten Augen. Fühler ziemlich schlank, ihr drittes Glied schmaler und länger als das zweite, die

beiden folgenden klein und länger als breit, das sechste dicker als die vorhergehenden, kaum quer, die vorletzten mässig quer, das Endglied kürzer als die zwei vorhergehenden zusammengekommen. Halsschild beträchtlich schmaler als die Flügeldecken, um ein Drittel breiter als lang, fast herzförmig, vor der Mitte stark gerundet erweitert, hinten ausgeschweift verengt, mit scharfen Hinterecken, vor dem Schildchen mit zwei breiten, mässig tiefen, durch einen schmalen, spiegelglänzenden Mittelkiel von einander getrennten Längseindrücken, seitlich hinter der Mitte mit je einem mässig tiefen Quereindruck, ziemlich kräftig und dicht rauhrunzelig punktiert, wenig glänzend. Flügeldecken mehr als doppelt so lang wie der Halsschild, viel länger als breit, schmal, ziemlich kräftig und ziemlich dicht, in deutlichen Längsreihen punktiert, neben der Naht etwas eingedrückt, etwas glänzender als der übrige Vorderkörper. Hinterleib sehr fein und wenig dicht punktiert, ziemlich glänzend. Letztes Hintertarsenglied so lang wie die vorhergehenden vier zusammengekommen. Länge: 2.2 mm.

AUCKLAND (*Sharp Coll.*).

BROUNIELLUM, gen. nov.

Von *Omalium* durch schlankere gewölbte Gestalt, den nach hinten stark verengten, herzförmigen Halsschild, den nach vorn stark abwärts geschwungenen Seitenrand und wulstartig abgesetzte Epipleuren des Halsschildes, tiefe, auf die abfallenden Seiten gehende Eindrücke des Halsschildes, grosse Beulen an der Wurzel der Flügeldecken neben dem Schildchen, verkürzten Kiel an der Mittelbrust und schmalen, nach rückwärts zugespitzten Mesosternalfortsatz und die hiedurch nur schmal getrennten Mittelhöften mit Sicherheit zu unterscheiden.

Gestreckt, ziemlich schmal, glänzend, fein und spärlich behaart. Kopf viel schmaler als der Halsschild, nach vorn verengt, hinten halsförmig eingeschnürt, zwischen den Fühlerwurzeln jederseits tief rundlich eingedrückt, vor den Ocellen mit je einem kleinen strichförmigen Eindruck, mit nicht aufgeworfenem Vorderrand, hinter den Fühlerwurzeln der Länge nach bis über die Mitte nach hinten kielartig erhoben. Augen mässig gross, gewölbt. Schläfen, kurz, aber deutlich abgesetzt. Fühler ziemlich gestreckt, gegen die Spitze mässig verdickt, das

erste Glied fast so lang als die zwei folgenden zusammen, das dritte länger als das zweite, die beiden folgenden so lang oder länger als breit, das sechste länger und beträchtlich dicker als das fünfte, die vorletzten mehr oder minder quer. Mandibeln einfach. Die Innenlade der Maxillen ist am Innenrande häutig und in der Apikalhälfte mit zahlreichen langen und dicken Stacheln bewehrt, die Aussenlade ist an der Spitze lang und dicht behaart. Kiefertaster ziemlich gestreckt, ihr drittes Glied kaum halb so lang wie das zweite, gegen die Spitze stark erweitert, daselbst breiter als lang, langgestreckt, fast viermal so lang wie das dritte, ziemlich gleichbreit, gegen die Spitze schwach verengt, fast viermal so lang wie breit. Das Kinn ist gross, trapezförmig, die Zunge leider bei dem einzigen Präparat, das ich machen konnte, nicht gut sichtbar. Lippentaster kurz und dick, das zweite Glied viel kürzer und wenig schmaler als das erste, das Endglied schmaler und viel länger als das zweite. Der Halsschild ist recht charakteristisch, herzförmig, nach rückwärts ausgeschweift verengt, vor der Mitte stark gerundet erweitert, auf der hinteren Hälfte mit zwei tiefen kräftigen Längseindrücken, an den Seiten stark gewölbt, unmittelbar hinter der Mitte mit einem tiefen Schrägeindruck, die Epipleuren nicht flach ausgebreitet, sondern gewölbt. Die Flügeldecken sind mindestens um die Hälfte länger als der Halsschild, nach rückwärts leicht erweitert, an der Naht mit je einer tiefen Längsfurche, neben dem Schildchen mit je einer kräftigen, grossen Beule, hinter dieser quergefurcht. Hinterleib mit breiten Seitenrändern, ziemlich gleichbreit, nur hinten stumpf zugespitzt. Mittelbrust längs der Mitte fein gekielt, ihr Fortsatz zwischen den Mittel Hüften schmal und zugespitzt, diese daher nur wenig getrennt. Die Hintertarsen kaum halb so lang wie die Schienen, ihre vier ersten Glieder sehr kurz, das Endglied fast um die Hälfte länger als die vier ersten zusammengenommen.

Als Genotype bezeichne ich *Brouniellum hirtellum* *.

In die neue Gattung, welche ausschliesslich auf Neu-Seeland lebt, sind ausser den im folgenden neu-beschrie-

* *Brouniellum sagoloide* konnte ich nicht als Genotype bezeichnen, da die Gattungsbeschreibung nach *B. hirtellum* m. (Fauvel, in litt.), welcher Name zugleich früher von Fauvel vergeben wurde, verfasst worden ist.

benen Arten unzweifelhaft noch die als *Omalius* beschriebenen *sagoloide* Sharp (Trans. Roy. Dublin Soc. (2) iii. 1886, p. 381), und *australe* Broun (Ann. & Mag. Nat. Hist. (6) xiv. 1894, p. 426), zu stellen.

Über die Lebensweise ist mir bisher nichts bekannt geworden.

Übersicht der bisher bekannten Arten :

- | | |
|--|---------------------------|
| 1. Halsschild ziemlich stark quer, fast um die Hälfte breiter als lang | <i>sagoloide</i> Sharp. |
| Halsschild nicht oder nur um ein Viertel breiter als lang | 2. |
| 2. Flügeldecken verhältnismässig dicht punktiert | 3. |
| Flügeldecken weitläufig punktiert | 4. |
| 3. Flügeldecken mässig fein punktiert, Halsschild um ein Viertel breiter als lang, Körper kleiner 2.5 mm. | <i>australe</i> Broun. |
| Flügeldecken sehr fein punktiert, Halsschild fast so lang wie breit. Länge : 2.8 mm. . | <i>majus</i> , sp. n. |
| 4. Flügeldecken kräftiger und mässig weitläufig punktiert | <i>hirtellum</i> , sp. n. |
| Flügeldecken besonders auf der hinteren Hälfte sehr fein und sehr weitläufig punktiert | <i>parcum</i> , sp. n. |

Brouniellum hirtellum, sp. n.

Brouniellum hirtellum Fauvel, in litt.

Rostrot, glänzend, am Vorderkörper wenig dicht, am Hinterleib sehr dicht goldgelb behaart, die Fühler, Taster und Beine rötlichgelb.

Kopf sehr fein, spärlich und kaum wahrnehmbar punktiert, grösstenteils, namentlich längs der Mitte geglättet. Die Schläfen nach rückwärts verengt, mit stumpf verrundeten Hinterecken, bis zur Rundung halb so lang wie der von oben sichtbare Längsdurchmesser der Augen. Die Fühler wenig lang, die vorletzten Glieder fast um die Hälfte breiter als lang. Der Halsschild ist viel schmaler als die Flügeldecken, fast so lang wie breit, vor der Mitte stark gerundet erweitert, nach rückwärts ausgeschweift, die Eindrücke besonders gross und tief, zwischen den Mittelgruben mit einer spiegelglänzenden, langen Schwiele, sonst kräftig und ziemlich dicht punktiert. Die Flügeldecken sind kaum doppelt so lang wie der Halsschild, die Querfurche hinter dem Höckerchen neben dem Schildchen weniger tief und scharf als bei *sagoloide* Sharp, so dass das Höckerchen weniger erhoben

erscheint. Die Punktierung ist entschieden weniger stark und dabei weitläufiger. Der Hinterleib ist sehr fein und dicht, hinten weitläufiger punktiert und dicht goldgelb behaart. Länge: 2.6 mm.

NORTH ISLAND: Pudding Hill, near Methven, 26.vi.1912 (*Coll. Brown*); Auckland (*Lawson, Coll. Sharp*).

Brouniellum parcum, sp. n.

Mit *Brouniellum hirtellum* ausserordentlich nahe verwandt und von ihm nur in nachfolgenden Punkten verschieden.

Der Kopf ist etwas kleiner, die Schläfen flacher ver-rundet, die Fühler gestreckter, die vorletzten Glieder nur wenig quer, das dritte und die folgenden jedoch kürzer, das dritte kaum länger als das zweite, das vierte und fünfte knopförmig, kaum so lang wie breit. Der Halsschild ist weniger lang, etwa um ein Viertel breiter als lang, in der Mitte am breitesten, die Eindrücke weniger tief und gross, die Punktierung feiner. Die Flügeldecken doppelt so lang wie breit, die Beule neben dem Schildchen flacher, unbestimmter punktiert, die Furche hinter der Beule weniger stark und scharf, die Punktierung feiner und weitläufiger. In der Färbung ist kein wesentlicher Unterschied festzustellen. Länge: 2.3 mm.

NORTH ISLAND: Pudding Hill, near Methven; Howick (both *Coll. Brown*).

Brouniellum majus, sp. n.

Durch grössere Gestalt, langen Halsschild, und die sehr fein und verhältnismässig dicht punktierten Flügeldecken ausgezeichnet.

Rostgelb, die Fühler, Taster und Beine heller, auf den Flügeldecken teilweise angedunkelt. Der Kopf ist um ein Drittel schmaler als der Halsschild, mit mässig tiefen Stirneindrücken, vorn und längs der Mitte breit geglättet, spiegelglänzend, seitlich sehr fein und deutlich punktiert. Die Augen vortretend, die Schläfen sehr kurz, die Hinter-ecken stumpf angedeutet, kürzer als der halbe, von oben sichtbare Längsdurchmesser der Augen. Fühler ziemlich lang, das dritte Glied wenig länger als das zweite, die folgenden zwei etwas breiter als lang, die vorletzten schwach quer, das Endglied beträchtlich länger als das zehnte. Der Halsschild ist um die Hälfte schmaler als

die Flügeldecken, so lang wie breit, herzförmig, vor der Mitte gerundet erweitert, nach rückwärts stark, deutlich ausgeschweift verengt, mit stumpfwinkeligen Hinterecken, die Eindrücke, besonders die vor dem Schildchen sehr stark, tief und breit. Die Punktierung ist sehr fein und ziemlich dicht, der Mittelkiel zwischen den Basalgruben und eine Beule vor dem seitlichen Eindruck geglättet, glänzend. Die Flügeldecken sind nicht doppelt so lang wie der Halsschild, nur mässig länger, als an der Spitze breit, die Beule neben dem Schildchen ist gross, aber flach, nur sehr undeutlich punktiert, glänzend, die Querfurche hinter ihr wenig ausgeprägt, breit, die Punktierung an der Basis mässig fein, sonst sehr fein und ziemlich dicht. Behaarung wie gewöhnlich goldgelb. Länge: 2·8 mm.

NEW ZEALAND, ohne nähere Angabe (*Coll. Broun*).

Ischnoderus nitescens, sp. n.

Ischnoderus planiculus Fauvel, in litt.

Mit *Ischnoderus politulus* Broun nahe verwandt, von ihm aber schon durch die Unterschiede in der Färbung namentlich der Fühler, viel kleinere Augen und viel längere Schläfen leicht zu unterscheiden.

Einfärbig rötlichgelb, nur die Fühler gegen die Spitze zu gebräunt, die Mittellinie des Kopfes, die Seiten des Halsschildes und der Hinterleib nicht dunkler, die Beine etwas heller gelb. Kopf wenig, aber immerhin deutlich etwas schmaler als der Halsschild, breiter als bis zum Vorderrand lang, hinter den Augen parallelseitig, mit schmal verrundeten Hinterecken, vor den Augen stark verengt, vor den winzigen, kaum sichtbaren Ocellen mit je einem sehr tiefen und scharf eingegrabenem, parallelen Längsfurchen, kräftig, hinten spärlich, in der Partie zwischen den Vorderrändern der Augen dicht runzelig punktiert, längs der Mittelzone und vorn geglättet, stark glänzend. Augen ziemlich gross, vorstehend, die Schläfen hinter ihnen etwas kürzer als der von oben sichtbare Längsdurchmesser der Augen. Halsschild etwas schmaler als die Flügeldecken, fast mehr als um ein Drittel breiter als lang, flach, etwas vor den deutlich etwas stumpfwinkeligen Vorderecken stark gerundet erweitert, von da nach rückwärts stark, vor der Basis etwas ausgeschweift verengt, vor dem Schildchen mit zwei starken

und breiten, aber nicht allzu tiefen Gruben, seitlich vor der Mitte mit einem schrägen, gekrümmten Eindruck, kräftig und besonders an den Seiten dicht punktiert, längs der Mitte und hinten geglättet, stark glänzend, die geglätteten Stellen einen Anker bildend. Die Hinterecken sind fast rechtwinkelig, ziemlich scharf abgesetzt. Flügeldecken fast doppelt so lang als der Halsschild, viel länger als zusammen breit, weniger kräftig als der Halsschild und in deutlichen, regelmässigen Punktreihen, hinten nur wenig undeutlicher punktiert. Hinterleib seitlich fein und dicht, längs der Mitte und hinten spärlich punktiert, daselbst stärker glänzend. Länge : 2.3 mm.

GREYMOUTH (*Helms*).

WALKERELLUS, subgen. nov.

Für die Merkmale, sehe die Beschreibung der folgenden Art.

Ischnoderus (Walkerellus) paradoxus, sp. n.

Von den übrigen Arten unterscheidet sich diese erstmalig aus Tasmania bekanntgewordene Art sehr auffallend durch sehr schmale Gestalt, besonders lange Flügeldecken und die grobe, runzelige, auf den Flügeldecken nicht in regelmässigen Punktreihen angeordnete Punktierung und ist die Aufstellung einer neuen Untergattung wohl gerechtfertigt.

Gelbbraun, die Flügeldecken grösstenteils dunkler, die Wurzel der im übrigen dunkelbraunen Fühler, die Taster und Beine hell rötlichgelb. Kopf fast so breit wie der Halsschild, nur wenig breiter als lang, nach rückwärts hinter den Augen deutlich erweitert, mit sehr kurz ver rundeten Hinterecken, vor den Augen verengt, rückwärts in ziemlicher Entfernung von den sehr kleinen Ocellen mit zwei ziemlich kurzen, aber tiefen und scharfen Längsfurchen, stark und dicht runzelig punktiert, mässig glänzend, vorn in der Mitte breit geglättet, matt. Augen vorstehend, die Schläfen beträchtlich länger als der von oben sichtbare Längsdurchmesser der Augen. Fühler vom sechsten Glied an keulig verdickt, das erste Glied oblong, verdickt, das zweite und dritte nur wenig länger als breit, das vierte und fünfte quer, die folgenden plötzlich verbreitert, stark quer, dunkel, die vorletzten um die Hälfte breiter als lang, das Endglied viel kürzer als

die beiden vorhergehenden zumsammengenommen. Halsschild nur sehr wenig schmaler als die Flügeldecken, ungefähr ein Drittel breiter als lang, nach rückwärts stark, geradlinig verengt mit scharfen Hinterecken, in der Mitte mit zwei scharfen und schmalen fast bis zum Vorder- und Hinterrande reichenden Furchen, neben dem Seitenrande hinter der Mitte mit je einer breiten und tiefen Längsgrube, kräftig und mässig dicht, auch auf der Mittelzone punktiert. Flügeldecken schmal, fast zwei und einhalbmal länger als der Halsschild, um die Hälfte länger als zusammen breit, parallelseitig, grob und ziemlich dicht runzelig punktiert, die Punkte nur hier und da in unregelmässigen Reihen angeordnet. Hinterleib mit breiten, flachen Seitenrändern, sehr fein, seitlich mässig dicht, längs der Mittelzone spärlich punktiert. Länge: 2 mm.

TASMANIA: Hobart (*G. C. Champion*), 1927.

PSEUDOPSIS Newm.

PSEUDOPSIELLA, subgen. nov.

Pseudopsis (Pseudopsiella) arrowi, sp. n.

Die ausgezeichnete Art unterscheidet sich von allen übrigen Arten sehr auffallend durch das Vorhandensein nur einer Dorsalrippe auf den Flügeldecken neben dem Schildchen, die zudem nach stark verkürzt ist, und sehr kurze Flügeldecken, so dass die Aufstellung einer neuen Untergattung (*Pseudopsiella*) gerechtfertigt erscheint.

Bräunlichrot, mit einigen wenigen unbestimmten dunkleren Flecken, Fühler, Taster und Beine rötlichgelb, kaum behaart. Kopf halb so breit wie der Halsschild, fast so lang als breit, hinter den Augen unmerklich erweitert, grob und sehr dicht, runzelig punktiert, matt, der Vorder- und ein Fleck in der Mitte der Scheibe unpunktet, spiegelglänzend. Augen klein, flach, die Schläfen langgestreckt, doppelt so lang wie der von oben sichtbare Längsdurchmesser der Augen. Fühler ziemlich kurz, gegen die Spitze verdickt, ihre ersten zwei Glieder stark verdickt, das dritte Glied viel schmaler und länger als das zweite, gestreckt, die folgenden breiter als lang, allmählich breiter und kürzer werdend, das zehnte beträchtlich breiter und auch länger als das neunte, um die Hälfte breiter als lang, das Endglied rundlich, länger

als das zehnte. Halsschild an der breitesten Stelle so breit wie die Flügeldecken, in der Mitte stumpfwinkelig gerundet erweitert, quer sechseckig, etwa ein Viertel breiter als lang, nach vorn mässig stark, nach rückwärts stärker verengt, auf der Scheibe mit vier breiten Längsrippen, in der Einsenkung zwischen den beiden mittleren Rippen mit einer äusserst schmalen, glänzenden Mittelkiel, seitlich mit einer grossen, breiten und langen Längsgrube, kräftig punktiert, die Längsrippen unpunktirt, die Oberfläche ziemlich matt. Flügeldecken beträchtlich kürzer als der Halsschild, viel kürzer als zusammen breit, ziemlich parallelseitig, mit nur sehr wenig gerundeten Seiten, ausser dem Naht- und Schulterkiel nur mit einer deutlichen Längsrippe neben dem Schildchen, welche kaum bis zur Mitte sich erstreckt, grob und tief, mässig dicht punktiert, einzelne Punkte in unbestimmte Längserhabenheiten erhoben, zwischen den Punkten glänzend. Hinterleib mit breiten flachen Seitenrändern, sehr fein und weitläufig punktiert, mässig glänzend. Länge: 2.8 mm.

NEW ZEALAND: Rotoiti, 15. vi. 1916 (*Coll. Brown*).

Ich erlaube mir vorstehende hervorragende Art Herrn Gilbert J. Arrow vom British Museum in Verehrung und Dankbarkeit für sein mir jederzeit erwiesenes Entgegenkommen zuzueignen.

NESONEUS, gen. nov.

In die Tribus Proteinini gehörig, von den übrigen Gattungen durch die schlankere, mehr gleichbreite Gestalt, die Bildung des Kopfes, namentlich die scharf spitzwinkelig vortretenden Hinterecken, die Bildung der Kiefer- und Lippentaster, sodass das nur wenig durch die Flügeldecken verdeckte Abdomen sehr verschieden.

Körper gestreckt, ziemlich gleichbreit, ziemlich flach. Kopf beträchtlich schmaler als der Halsschild, stark quer, mit scharf spitzwinkelig vorstehenden Hinterecken und deutlichen Schläfen, hinten mässig abgeschnürt, zwischen den Augen mit zwei stark erhobenen, scharfen, gerundeten, mit einander fast parallelen Querwülsten. Fühler ziemlich dünn, gegen die Spitze nur mässig verdickt, das dritte Glied schmaler und kürzer als das zweite, das vierte quer, die folgenden allmählich breiter und kürzer werdend, die vorletzten aber höchstens um die Hälfte breiter als

lang, das Endglied so lang als die zwei vorhergehenden zusammengenommen. Oberlippe quer, lang bewimpert, am Vorderrande flach ausgerandet und vorn mit einem ebenso ausgerandeten Hautsaum versehen. Die Mandibeln kurz, ungezähnt. Die Aussenlade der Maxillen ist hornig, schmal, an der Spitze nach innen in einen schmalen, langen Haken gekrümmt, hinter diesem in der Apikalhälfte mit einer Anzahl scharfer, langer Stacheln. Die Innenlade ziemlich breit, gegen die Spitze etwas erweitert, an der ganzen Spitze und an der Innenseite bis etwa zur Hälfte lang büschelförmig behaart. Kiefertaster ziemlich gestreckt, das erste Glied sehr kurz, das zweite lang, mehr als doppelt so lang wie breit, gegen die Spitze ziemlich erweitert, das dritte nur mässig kürzer als das zweite, gegen die Spitze gerundet verdickt, um die Hälfte länger als breit, das Endglied sehr schmal, pfriemenförmig, gegen die Spitze verengt, fast so lang wie das vorhergehende. Das Kinn quer trapezförmig. Die Zunge häutig, sehr breit, am Vorderrande breit stumpfwinkelig ausgeschnitten, in der Mitte des stumpfen Winkels schmal eingeschnitten. Die Lippentaster ziemlich lang gestreckt, die Zunge weit überragend, das Basalglied gegen die Spitze verengt, um mehr als die Hälfte länger als breit, das zweite Glied viel schmaler und nur halb so lang wie das erste Glied, ziemlich parallelseitig, viel länger als breit, das Endglied ist viel schmaler und viel länger als das zweite. Der Halsschild ist schmaler als die Flügeldecken, stark quer, mit verrundeten Winkeln, ziemlich flach, die Epipleuren bei seitlicher Ansicht deutlich sichtbar. Die Flügeldecken viel länger als der Halsschild, ziemlich flach, mit scharf abgesetzten Epipleuren, den Hinterleib nur mässig überdeckend, das dritte Tergit ganz oder teilweise freilassend. Der Hinterleib ziemlich gleichbreit, vom sechsten Tergit an verengt, oben ziemlich gewölbt. Die Vorderbrust ziemlich breit, in der Mittellinie gekielt, hinten zugespitzt. Der Fortsatz der Mittelbrust spitzig zwischen die Mittelhüften verlängert. Die Vorderhüften quer, sehr wenig aus der Vorderbrust hervorragend. Beine kurz, die Schienen dicht bewimpert, an den Tarsen das Endglied viel länger als die übrigen Glieder zusammengenommen.

Über die Lebensweise der Gattung ist mir nichts bekannt.

Nesoneus acuticeps, sp. n.

Omalium acuticeps Bernhauer, in litt.

Proteinus glaucus Fauvel, in litt.

Pechschwarz, matt, dicht grau-seidig behaart, die Wurzel der Fühler, die Taster und Beine rötlichgelb. Kopf um die Hälfte schmaler als der Halsschild, um mehr als die Hälfte breiter als lang, äusserst fein und äusserst dicht chagrinartig punktiert, vor den Stirn-Querfurchen geglättet, glänzend. Augen gross, die hinten scharf spitzwinkligen Schläfen sehr kurz, ein Viertel so lang wie der von oben sichtbare Längsdurchmesser der Augen. Halsschild um die Hälfte breiter als lang, an den Seiten ziemlich gleichmässig, sanft gerundet, hinter der Mitte mit vier sehr flachen, quer gestellten undeutlichen, bisweiten kaum sichtbaren Eindrücken, äusserst fein und äusserst dicht chagrinartig punktiert, matt. Die Flügeldecken sind mehr als doppelt so lang wie der Halsschild, viel länger als zusammen breit, nach rückwärts unmerklich erweitert, ebenso dicht, aber etwas weniger fein, deutlich etwas rauh punktiert. Der Hinterleib ist flach quergewölbt, matt chagriniert, die Spitze etwas rötlich, die Seiten sind mässig breit abgesetzt. Länge: 2-2.2 mm.

Beim ♂ ist das sechste Sternit in der Mitte des Hinterandes bogig ausgeschnitten, das fünfte ist der ganze Breite nach flach, aber immerhin stark ausgeschnitten und an den Seiten dicht und gelblichweiss behaart.

NORTH ISLAND: Waitakerei Range, Auckland (Coll. Brown); ohne nähere Fundortangabe (R. N. Parker, in Coll. G. C. Champion).

HOLOTROCHUS Er.

Übersicht der neuseeländischen Arten:

- | | |
|---|------------------------|
| 1. Flügeldecken quadratisch, mindestens so lang wie der Halsschild | 2. |
| Flügeldecken viel kürzer als der Halsschild | 4. |
| 2. Eindruck vor den Hinterecken der Halsschildes stärker, ziemlich tief, Gestalt kleiner und schmaler. Länge: 3-5 mm. | <i>montanus</i> Broun. |
| Eindruck vor den Hinterecken des Halsschildes schwächer, ziemlich seicht, Gestalt grösser, robuster. Länge: 4 mm.. | 3. |
| 3. Fünftes Sternit des ♂ mit einer grossen, runden Grube, Färbung dunkler | <i>browni</i> , sp. n. |

- Fünftes Sternit des ♂ ohne Grube, Färbung rötlich. *ferrugineus* Broun.
4. Grösser, über 3·5 mm. 5.
- Kleiner, höchstens 3·5 mm. 8.
5. Halsschild stark glänzend, nicht chagriniert. 6.
- Halsschild matt glänzend, deutlich chagriniert.
6. Halsschild fein punktiert. *arrowi*, sp. n.
- Halsschild stark punktiert. *nitidorsis* Broun.
- 7.
7. Halsschild nach vorn allmählich und gleichmässig verengt, dichter punktiert. *setigerus* Broun.
- Halsschild bis zum ersten Viertel fast erweitert, sehr spärlich punktiert.
8. Grösser, mindestens 2·5 mm. lang. *monstrosus*, sp. n.
- Kleiner, höchstens 2·3 mm. lang. 9.
9. Hinterleib ziemlich grob und nicht allzu spärlich punktiert. 14.
- Hinterleib sehr fein oder kaum punktiert. *helmsi* Fauv.
10. Hinterleib nur mit wenigen Punkten. 10.
- Hinterleib mit zahlreichen Pünktchen. *vagapunctatus* Fauv.
11. Körper schmaler und kleiner (2·5 mm.) .. 11.
- Körper robuster, grösser (über 2·5 mm.) .. *brevipennis* Broun.
12. Halsschild äusserst fein, aber immerhin erkennbar chagriniert. Länge: 3 mm. .. 12.
- Halsschild nicht chagriniert, spiegelglänzend. *microphthalmus* Fauv.
13. Halsschild nach vorn stärker und fast geradlinig verengt. Länge: 3 mm. 13.
- Halsschild nach vorn kaum oder nur sehr wenig verengt. Länge: 3·5 mm. *laevigatus* Broun.
14. Halsschild deutlich chagriniert. *cæcus* Broun.
- Halsschild nicht chagriniert, spiegelglänzend. *anophthalmus* Fauv.
- *gracilis* Broun.

Holotrochus brouni, Fauv.*, Rev. d'Ent. 1900, p. 186.

Eine grosse, dicht skulptierte Art. Schwarz, mässig glänzend, die Hinterränder der Hinterleibsringe rötlich, die Fühler, Taster und Beine rostrot. Kopf mehr als halb so breit wie der Halsschild, quer, fein und ziemlich dicht punktiert, im Grunde deutlich chagriniert, wenig glänzend. Augen ziemlich gross, deutlich vorstehend. Fühler gegen die Spitze mässig verdickt, das dritte Glied fast doppelt so lang wie das zweite, die folgenden oblong, allmählich an Länge abnehmend, die vorletzten mässig quer, das Endglied länger als breit. Halsschild so breit wie die Flügeldecken, ein Viertel breiter als lang, an den Seiten ziemlich gleichmässig und deutlich gerundet, vor

* [This species was mentioned several times by Fauvel in the work cited, but was not separately described, because Fauvel had not seen the unique type of *H. ferrugineus* Broun, and was not convinced that the two were really distinct.—H. S.J.]

den rechtwinkeligen Hinterecken etwas angeschweift, nach vorn nur sehr wenig mehr als nach rückwärts verengt, kräftig und dicht punktiert, im Grunde sehr deutlich chagriniert, fettglänzend, der rückwärtige Teil der Mittelzone unpunktiert. Flügeldecken etwas länger als der Halsschild, wenig breiter als lang, gleichbreit, mit vorstehenden Schultern, mässig stark und ziemlich dicht punktiert, die Punkte hie und da in Längslinien angeordnet. Hinterleib nur sehr undeutlich und sehr spärlich punktiert, dicht quer gestrichelt, ziemlich glänzend. Länge: 4 mm.

Beim ♂ ist das fünfte Sternit sehr breit und sehr tief ausgehöhlt*, an der Basis der Grube befindet sich in der Mitte ein kräftiger, scharfer, nach hinten vorragender Stachel.

NEW ZEALAND: Epsom, 12. ii. 1912 (*Coll. Brown*); Auckland (*Coll. Sharp*); Te Aroha (North I.), v. 1902 (*J. J. Walker, in Coll. G. C. Champion*).

Holotrochus arrowi, sp. n.

Unter den grösseren Arten mit kurzen Flügeldecken durch den deutlich chagrinierten Halsschild ausgezeichnet und mit keiner der übrigen Arten zu verkennen.

Pechbraun, der Kopf, der Vorder- und Hinterrand des Halsschildes, so wie der grösste Teil des Hinterleibes rötlich. Kopf halb so breit wie der Halsschild, deutlich chagriniert, kräftig und weitläufig punktiert, wenig glänzend. Augen mässig gross, flach, nach unten zu in die Länge gezogen, daher schmal. Fühler ziemlich kurz, das dritte Glied länger als das zweite, das vierte und fünfte länger als breit, die vorletzten kaum um die Hälfte breiter als lang. Halsschild etwas breiter als die Flügeldecken, nur wenig breiter als lang, im letzten Drittel am breitesten, nach rückwärts zu den scharfwinkeligen Hinterecken wenig, nach vorn ziemlich stark, in flachem Bogen verengt, vor dem Hinterrande in einiger Entfernung vom Seitenrande mit je einer feinen und scharfen, über das hintere Drittel nach vorn reichenden Längsfurche, die Mittellinie erhoben, unpunktiert, sonst mit einer grösseren Anzahl kräftiger, ungleicher Punkte unregelmässig besetzt, im Grunde kräftig chagriniert, fett glänzend. Flügeldecken

* Sehe Brown, Bull. New Zealand Inst., no. 1, p. 17, 1910.

fast nur ein Drittel so lang wie der Halsschild, beinahe dreimal breiter als lang, nach rückwärts schwach erweitert, innerhalb der deutlichen Schulterecken an der Basis schräg eingedrückt, mässig stark und spärlich punktiert, dazwischen mit unregelmässigen schrägen Längsrünzeln, wenig glänzend. Hinterleib nur mit wenigen Punkten, quergestrichelt, mässig glänzend. Länge : 3·5 mm.

SOUTH ISLAND : Mt. Owen, 26. xii. 1914 (*Coll. Broun*).

Herrn G. J. Arrow in Freundschaft gewidmet.

Holotrochus monstrosus, sp. n.

Dem *Holotrochus setigerus* Broun ausserordentlich nahe stehend, von ihm durch grössere und viel breitere Gestalt, sowie durch nachfolgende weitere Merkmale verschieden :

Der Kopf ist etwas breiter und entschieden kürzer, die Punktierung kräftiger und noch viel spärlicher, die Augen sind kleiner, viel weniger in die Länge gezogen als bei *setigerus* Broun, nur mässig länger als breit, während sie bei der verglichenen Art mehr als doppelt lang wie breit sind. Die Fühler sind kürzer, das vierte nicht länger als breit, die folgenden bei breitester Ansicht deutlich quer. Der Halsschild ist breiter und kürzer, fast etwas breiter als die Flügeldecken, um ein Viertel breiter als lang, nach vorn bis zum ersten Drittel sanft gerundet und etwas erweitert, von da an plötzlich, ziemlich stark verengt, während er bei *setigerus* fast etwas schmaler als die Flügeldecken und nur mässig breiter als lang und nach vorn fast geradlinig und gleichmässig, jedoch nur schwach verengt ist. Die Punktierung ist etwas gröber und noch viel weitläufiger als bei *setigerus*. Die Flügeldecken sind wenig weitläufiger punktiert, die Basaleindrücke flacher und breiter. Die Punktierung des Hinterleibes ist ein wenig weitläufiger. Der Körper ist viel breiter, etwas weniger gewölbt und macht einen plumperen Eindruck. Länge : 4 mm.

SOUTH ISLAND : Hump Ridge (near Invercargil), ii. 1912.

Tribus STENÆSTHETINI.

Übersicht über die Gattungen :

- | | |
|--|------------------------------|
| 1. Tarsen viergliedrig | <i>Stictocranius</i> J. Lec. |
| Vorder- und Mitteltarsen fünfgliedrig, Hintertarsen viergliedrig | 2. |

2. Halsschild sehr dicht und gleichmässig punktiert, ohne Furchen, Flügeldecken halb so lang wie der Halsschild, Halsschild seitlich nicht oder nur undeutlich gerandet *Stenæsthetus* Sharp.
 Halsschild nicht oder nur sehr weitläufig punktiert, auf der Scheibe mindestens mit zwei Längsfurchen, die in seltenen Fällen sehr restringiert sein können, Flügeldecken nur fast ein Viertel so lang wie der Halsschild, dieser seitlich sehr scharf gerandet
 3. Fühler äusserst dünn, gegen die Spitze nicht verdickt Halsschild unpunktirt [gen. nov.
*Aulacosthætus**,
 Fühler gegen die Spitze keulig verdickt, die letzten zwei Glieder stark verdickt, Halsschild mit einer Anzahl von groben Punkten *Agnosthætus*, gen. nov.

AULACOSTHÆTUS, gen. nov.

Von *Stenæsthetus* Sharp schon nach dem Äusseren durch den Mangel der Punktierung des Halsschildes und der Flügeldecken, den erweiterten, hoch gewölbten Körper und die ausserordentlich kurzen Flügeldecken und die Furchen auf dem Halsschild, welcher am Seitenzande scharf abgesetzt erscheint, leicht zu unterscheiden.

Kiefer sehr lang und schlank, in der Mitte mit einem langen, stachelartigen, gebogenen Zahn. Kiefertaster ausserordentlich lang und schlank, das vorletzte Glied sehr gestreckt, in der Mitte verdickt, mehr als dreimal so lang, wie an der breitesten Stelle breit, das winzige Endglied kaum angedeutet, die innere Maxillarlade breit; an der abgestutzten Spitze sehr dicht mit doppelt gekrümmten Stacheln besetzt, die äussere Lade noch breiter, gegen die Spitze erweitert und an der breit abgesetzten Spitze mit ähnlichen, jedoch kürzeren Stacheln bewehrt. Die Lippentaster ziemlich kurz, das erste Glied an der Basis gekrümmt, gegen die Spitze keulig verdickt, mehr als doppelt so lang wie an der dicksten Stelle breit, das zweite Glied kaum schmaler als das zweite, gegen die Spitze schwach verengt, mehr als doppelt so lang wie breit, das Endglied pfriemenförmig. Die Fühler ausserordentlich dünn und lang, die beiden letzten Glieder nur

* Obwohl diese Gattung nicht auf Neu-Seeland vorkommt, so habe ich sie doch mit Rücksicht auf ihre ausserordentlich grosse Verwandtschaft mit der neuseeländischen Gattung hier kurz behandelt.

ganz wenig dicker als die vorhergehenden, mindestens dreimal so lang wie breit, fast parallelschönig. Vorderbrust vor den quer zapfenförmigen, an einander stehenden Vorderhüften stark entwickelt. Mittelbrust hinten nur wenig zwischen die Mittelhüften eintretend, deutlich gekielt. Vorder- und Mitteltarsen fünfgliedrig, ihr erstes Glied wenig länger als das Endglied, Hintertarsen viergliedrig, das erste Glied ausserordentlich gestreckt, viel länger als die drei übrigen zusammen. Hinterleib an der Wurzel scharf gekielt.

Über die Lebensweise ist bisher nichts näheres bekannt. Alle bisher bekannten Arten stammen von Brasilien.

Genotypus ist die Art *A. rambouseki* Bernhauer.

Übersicht der Arten :

1. Halsschild mit vier scharfen, schmalen Längsfurchen, welche bis vor die Mitte reichen, höchstens so lang wie breit 2.
Halsschildfurchen auf kurze Längsstriche an der Basis reduziert, Halsschild deutlich länger als breit, schmal, Kopf matt beträchtlich schmaler als der Halsschild. Länge: 1.5–1.8 mm. (*Klima*, Minas Geraës) *klimai*, sp. n.
2. Kopf glänzend, glatt, Färbung schwarzbraun, Gestalt breit, robust, Vorderkörper spiegelglänzend, Hinterleib ziemlich kräftig und nicht allzudicht punktiert, die inneren Halsschildfurchen sehr scharf und besonders rückwärts tief eingegraben. Länge: 2 mm. (*Klima*, Minas Geraës) .. *nitidiceps*, sp. n.
Kopf matt, Färbung rötlichgelb bis bräunlichrot, Vorderkörper mehr oder minder matt, Hinterleib sehr fein, schwer sichtbar und äusserst dicht punktiert 3.
3. Kopf ziemlich dicht und ziemlich kräftig punktiert, schmaler als der Halsschild, innere Halsschildfurchen mässig tief eingegraben, nach hinten stark divergierend. Länge: 2 mm. (Mus. Prag.)... *rambouseki*, sp. n.
- Kopf nicht oder kaum punktiert 4.
4. Kopf schmaler als der Halsschild, dieser so lang wie breit, ziemlich glänzend, äussere Halsschildfurchen nur wenig über die Mitte reichend, die inneren hinten wenig divergierend, schmal und gerade. Länge: 1.5–1.8 mm. (*Klima*, Minas Geraës) *pauloensis*, sp. n.
Kopf fast breiter als der Halsschild, dieser etwas breiter als lang, matt, äussere Halsschildfurchen fast bis zum Vorderrand reichend, die inneren sehr tief und besonders breit, hinten nach auswärts geschwungen. Länge: 2 mm. (Mus. Prag.) *mrazi* Ramb.

AGNOSTHÆTUS, gen. nov.

Die bisher bekannten Arten dieser Gattung wurden von Major T. Broun zufolge einer Notiz in Trans. N. Zealand Inst. xlv. 1911, p. 400, veranlasst durch eine Bestimmung seitens Fauvel's als Angehörige der Gattung *Dimerus* Fiori beschrieben. Es ist mir nicht verständlich, wie Fauvel dazu kam, die ihm von Broun zugeschickte Art als zu *Dimerus* gehörig bezeichnet hat, da diese Gattung eigentlich gar keine Verwandtschaft zu den neuseeländischen Tieren aufweist. Diese sind vielmehr ganz augenfällig in die Subfamilie *Enæsthetinæ* und hier infolge des ungerandeten Hinterleibes in die Tribus *Stenæsthetini* zu verweisen. Durch die fünfgliederigen Vorder- und Mitteltarsen und die viergliederigen Hintertarsen ist die neue Gattung sowohl mit *Stenæsthetus* Sharp und *Aulacosthætus* m. nahe verwandt, unterscheidet sich aber von ersterer schon rein äusserlich durch die Skulptur des Halsschildes, insbesondere die Längsfurchen und den Mangel der dichten Punktierung, die ausserordentlich kurzen, gar nicht oder nur einzeln punktierten Flügeldecken, starken Glanz, den an den Seiten scharf gerandeten Halsschild und die kurzen gegen die Spitze zu stark verdickten Fühler und das stärker verdickte vorletzte Glied der Kiefertaster. Von *Aulacosthætus* unterscheidet sich die Gattung durch die verhältnismässig stark verdickten Fühler, deren letzten zwei Glieder eine gut abgesetzte zweigliedrige Keule bilden, das verdickte vorletzte Kiefertasterglied, geringere Wölbung des Körpers, durch den nicht bauchig erweiterten Hinterleib und durch viel gröbere Furchen des Halsschildes. Die Mandibeln besitzen wie bei den verwandten Gattungen einen kräftigen stachelartigen Zahn am Innenrande. Die Fühler sind kurz, ihre beiden ersten Glieder sind verdickt, die folgenden länger als breit, das achte und neunte quer, das zehnte etwa so lang wie breit und stark verdickt, das elfte viel länger als das zehnte. Die Kiefertaster sind gestreckt, das vorletzte Glied stark verdickt, doppelt so lang wie breit, das Endglied winzig klein, schwer erkennbar. Der Kopf ist gross, hinten mässig eingeschnürt, die Augen nehmen den grössten Teil der Kopfseiten ein und sind grob facettiert. Schläfen sehr kurz. Halsschild hoch gewölbt, an den Seiten scharf gerandet, ohne abgesetzte

Epipleuren. Flügeldecken ausserordentlich kurz, höchstens halb so lang wie zusammen breit, nach rückwärts stark erweitert, hinten flach ausgeschnitten. Hinterleib ungerandet, ziemlich gleichbreit, hinten allmählich zugespitzt. Beine ziemlich kurz, an den viergliedrigen Hintertarsen das erste Glied länger als die übrigen zusammen genommen. Leider konnte ich beim Vorhandensein eines nur spärlichen Materials kein Präparat der Mundteile machen.

Über die Lebensweise der Gattung ist mir bisher nichts bekanntgeworden. Als Genotypus ist *Agnosthætus browni* zu betrachten.

Übersicht der Arten :

- | | |
|--|----------------------------|
| 1. Gestalt sehr schlank, Halsschild fast doppelt so lang wie breit | <i>whitehorni</i> Broun. |
| Gestalt mässig schlank, Halsschild nur mässig länger als breit | 2. |
| 2. Kopf dicht, grob, runzelig punktiert, mit einem schmalen glänzenden Mittelkiel, Hinterleib kräftig punktiert | <i>cariniceps</i> , sp. n. |
| Kopf weitläufig oder mässig dicht punktiert, mit einer breiten geglätteten Mittelzone, Hinterleib fein punktiert | 3. |
| 3. Kopf hinter der Mitte fast glatt, nur mit einer Reihe von feinen Punkten vor der Basis, Halsschild mit zwei geraden Mittelfurchen | <i>vicinus</i> Broun *. |
| Kopf hinter der Mitte punktiert, nicht geglättet | 4. |
| 4. Kopf mit zwei deutlichen Längsfurchen, zwischen diesen und den Augen flach ausgebreitet | 5. |
| Kopf ohne scharfe Längsfurchen, die Stirneindrücke von den Augen durch kielartige Erhabenheiten getrennt | <i>stilbus</i> Broun. |
| 5. Hinterleib einfarbig rostrot, der Nahtstreifen auf den Flügeldecken sehr deutlich, Kopf ausser den gerunzelten Seiten fein punktiert | <i>bisulciceps</i> Broun. |
| Hinterleib vor der Spitze mit einer dunkleren Binde, der Nahtstreifen sehr undeutlich, Kopf ausser den gerunzelten Seiten, kräftig und ziemlich dicht punktiert, längs der Mittelzone breit geglättet, glänzend .. | <i>browni</i> , sp. n. |

Agnosthætus cariniceps, sp. n.

Durch die Skulptur des Kopfes von allen übrigen Arten leicht zu unterscheiden, auch durch die kräftige Punktierung des Abdomens sehr aus gezeichnet.

* Die Broun'schen Arten wurden, da ich sie nicht zu Gesicht bekommen konnte, nur nach der Beschreibung in die Tabelle aufgenommen.

Hell rostrot, glänzend, der Hinterleib gelb behaart, die Taster und Beine wenig heller. Kopf mit den Augen fast breiter als der Halsschild rundlich, mit zwei nicht scharfen Längseindrücken, grob und dicht, unregelmässig runzelig punktiert, längs der Mittellinie mit einem schmalen, erhobenen, vorn und rückwärts verkürzten Mittelkiel. Halsschild um ein gutes Stück länger als breit, im ersten Drittel am breitesten, von da nach vorn gerundet, nach rückwärts geradlinig verengt zu beiden Seiten der breiten, hoch erhobenen spiegelglänzenden Mittelzone mit je einer breiten, scharfen und tiefen, ziemlich geraden, nur hinten nach aussen geschwungenen. Längsfurche, in welcher vier sehr grobe Punkte eingestochen sind, seitlich mit je einer ähnlichen, aber kürzeren und in der Mitte nach einwärts gebogenen punktierten Längsfurche, in welcher vier sehr grobe Punkte eingestochen sind, seitlich, mit je einer ähnlichen, aber kürzeren und in der Mitte nach einwärts gebogenen punktierten Längsfurche, längs der Basis mit acht Punkten, von denen die mittleren zwei gröber sind, sonst unpunktiert. Flügeldecken ausserordentlich kurz, mehr als doppelt so breit wie an der Naht lang, diese mit einem scharf eingegrabenen Längsstreifen zu beiden Seiten, mit einer über die Mitte der oberfläche gehenden Querpunktreihe und einem einzelnen Punkt in letzten Viertel in einiger Entfernung von der Naht. Hinterleib ziemlich kräftig und sehr dicht, etwas rauh punktiert, die Punktierung nimmt auf dem hinteren Ende der einzelnen Sternite an Dichte etwas ab, das dritte (erste freiliegende) Tergit ist das längste und an der Wurzel breit quereingedrückt. Länge : 2.5 mm.

SOUTH ISLAND : Routeburn (north of Lake Wakatipu), 13. ii. 1914 (*T. Hall, in Coll. Broun*).

Agnosthætus brouni, sp. n.

Infolge der etwas dichteren Punktierung des Kopfes ist diese Art der vorhergehenden jedenfalls am nächsten verwandt, von ihm jedoch durch die namentlich in der Mittelzone viel weitläufigere Punktierung des Kopfes, körnere und stärker getogene Mittelfurchen des Halsschildes, nicht punktierte Flügeldecken und den viel feiner punktierten, vor der Spitze mit einer unbestimmten dunkleren Binde versehenen Hinterleib leicht zu unterscheiden.

Rötlichgelb, glänzend, die Fühler, Taster und Beine heller, das fünfte und sechste (dritte und viertefreiliegende) Tergit grösstenteils etwas dunkler. Kopf rundlich, so breit wie der Halsschild, auf der Stirn mit zwei scharfen, langen und parallelen Längsfurchen, zwischen diesen und den Augen äusserst dicht runzelig skulptiert, im Mittelteil grob und dicht punktiert, mit breiter, durchgehender Mittelzone. Halsschild etwas breiter als die Flügeldecken, etwa ein Viertel länger als breit, im ersten Drittel gerundet erweitert, nach rückwärts geradlinig verengt, die beiden Mittelfurchen sind kürzer als bei der vorhergehenden Art, vorn und rückwärts stark nach aussen gebogen, scharf, tief und breit eingegraben, mit je drei etwas undeutlich eingestochenen Punkten, an den Seiten befindet sich ein weniger langer, scharf eingegrabener, gebogener Längseindruck, vor dem Hinterrande sind acht Punkte eingestochen. Flügeldecken weniger als ein Drittel so lang wie der Halsschild, nach rückwärts erweitert, doppelt so lang wie breit, mit schwach eingegrabenem Nahtstreifen, ohne Punktierung. Hinterleib fein und dicht punktiert, dicht gelb behaart, ziemlich, matt. Länge: 2.5 mm.

Ich besitze von dieser Art nur ein einziges von Helms gesammeltes, von Edm. Reitter vor Jahren erhaltenes Stück von Neu-Seeland ohne näheren Fundort.

XV.—*New and less-known Palestinian Orthoptera.*

By B. P. UVAROV, D.Sc., British Museum (Natural History).

[Plate IX.]

In 1924, the number of Orthoptera known from Palestine was 122 (Buxton and Uvarov, Bull. Soc. R. Ent. Egypte, 1923, p. 213), but Bodenheimer, in 1935, was able to list as many as 193 species (Arch. Naturgesch., N.F. 4, pp. 145–209). That this number is still far from the final can be seen from the fact of the recent discovery in that country of six Orthoptera new to science, including even a striking new genus of Mantidæ, which are described below.

The types of the new species and subspecies are deposited in the British Museum (Natural History).

Mantidæ.**XENOMANTIS, gen. nov.**

A member of the subfamily Toxoderinæ, allied to *Æthalochroa* Wood-Mason, but strongly different from it in smaller size, appendiculate eyes, vertex provided with a bituberculate appendage, anterior coxæ almost as long as metazona of pronotum, and posterior wings with central spot and concentric pattern.

Head wider than pronotum. Frontal scutellum moderately transverse, weakly margined; upper margin in the middle produced forward into a short tubercle. Eye with more or less long narrow appendage. Vertex near the eye produced into an acute tubercle; in the middle with a short appendage narrowed to the bifucate apex. Occiput produced into blunt conical tubercle behind the eye (text-figs. 1 A, D).

Pronotum rugose and carinate; supracoxal dilation weak; metazona a little longer than anterior coxa.

Cerci broad foliaceous in both sexes.

Elytra and wings fully developed; elytra with sinuate cross-veins; wings with central spot and concentric pattern in both sexes (Pl. IX.).

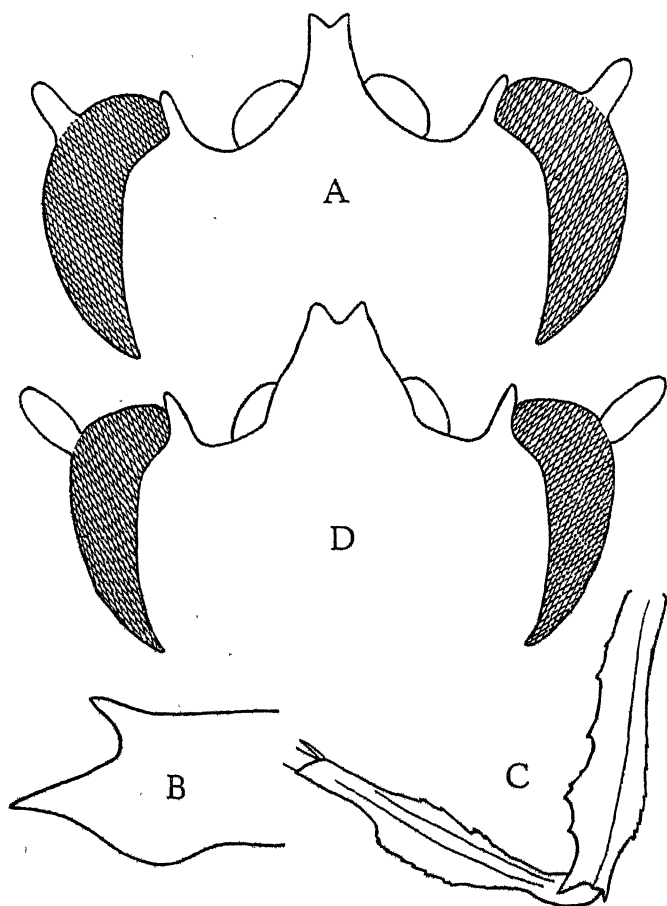
Front coxa triangular in section, carinate; upper carina weakly expanded near the apex; apical lobes rounded-triangular. Front femur slender; external apical lobes triangular, acute, the lower one projecting well beyond the apex of the femur, the upper one shorter (text-fig. 1 B); three discoidal, six external, about 12-13 internal spines, the latter unequal in size. Front tibia linear, practically straight; distinctly shorter than femur, with 6-7 external and 3-4 internal apical spines. Middle and hind femur triangular in section, strongly carinate, with lower carinæ foliaceous and irregularly dentate; lower apical lobe acutely projecting (text-fig. 1 C). Middle and hind tibia strongly carinate; upper carina expanded in the middle (text-fig. 1 C).

Genotype: *Dorymantis somalica* Beier, 1930.

It is quite incomprehensible that Beier should have referred his *Dorymantis somalica* (Zool. Anz. xci. p. 197) to the genus *Dorymantis* Giglio-Tos, while the description of that genus mentions a number of characters not found in *somalica*. In *Dorymantis* the frontal scutellum

should be semicircular; eyes not appendiculate; external apical lobe of front femur not produced beyond the apex

Text-fig. 1.



A, *Xenomantis somalica* (Beier), ♂, head viewed from behind; B, ditto, apex of anterior femur; C, ditto, left posterior femur and tibia viewed from below; D, *Xenomantis palmonii*, sp. n., ♀, head viewed from behind.

of the femur; wings not coloured; and *D. somalica*, with all these characters well expressed, certainly cannot

be included into the genus. Still less comprehensible is Beier's key to genera of Toxoderinæ (Gen. Insect., 198 fasc., p. 2), where *Dorymantis*, known to him only from *D. somalica*, is included in the group with unarmed eyes, although in the description of *D. somalica* he says: "Augen mit einem kräftigen, stumpfen Dörnchen." In fact, *D. somalica* cannot be determined as a *Dorymantis* by the use of Beier's key, and there is not the slightest doubt that the original inclusion of *somalica* in *Dorymantis* has been done with complete disregard to the description of that genus.

Actually, *somalica* and a new species from Palestine described below, constitute a well-characterized new genus approaching the Indian *Æthallochroa*, but differing from it by the characters indicated above. In some species of *Æthallochroa*, such as *A. affinis* W.-Mas., the eyes have an indication of appendage, and vertex has a tendency to develop structures typical for *Xenomantis*, but excellent diagnostic characters of the latter are found in the structure of genicular lobes, and in the length of pronotum, the metazona of which, even in *Æthallochroa affinis*, is almost twice as long as anterior coxa, while it is even longer in the more typical species of the genus.

Xenomantis palmonii, sp. n.

(Text-fig. 1 D; Pl. IX. fig. 2.)

♀.—Very similar to *X. somalica* Beier, differing from it in the following characters:—ocular appendages distinctly longer and distinctly constricted at the base; lateral appendages of the vertex adjoining the eyes longer and more acute; median appendage of the vertex broadly triangular (instead of narrowly parallel-sided in *X. somalica*); head, pronotum, and legs with very distinct granules; pronotum relatively longer; supra-coxal dilatation of pronotum scarcely developed; hind wing with the concentric dark pattern more strongly developed; front femur narrower.

Total length 68; pronotum 22.5; metazona 17; width of coxal dilatation 3.5; elytra 39; front coxa 10.5; hind femur 8.5 mm.

Described from a single female taken on the eastern bank of the river Jordan, near the Lake Gennesaret, 1938 (*J. Palmonii*).

The comparison of the new species with *X. somalica* is made somewhat difficult because the latter is known only from a male, which sex is unknown in *X. palmonii*. However, while the difference between the two in the shape of the median processes of the vertex may be sexual, there is no reason to suggest the same with regard to the shape of the ocular appendages and the lateral projections of the vertex; as well as to the pattern of hind wings. I am convinced, therefore, that the two insects are specifically distinct, and their differences should be clear from the appended illustrations (text-fig. 1 and Pl. IX.).

The discovery of *Xenomantis palmonii* at the upper reaches of the Jordan valley adds one more purely Ethiopian member to its Orthopterous fauna, which remains still very imperfectly investigated.

Tettigoniidæ.

Paradrymadusa philbyi Uvarov. (Text-figs. 2 A, B.)

1927. *Paradrymadusa philbyi* Uvarov, Ann. & Mag. Nat. Hist. ser. 9, xix. p. 273, fig.

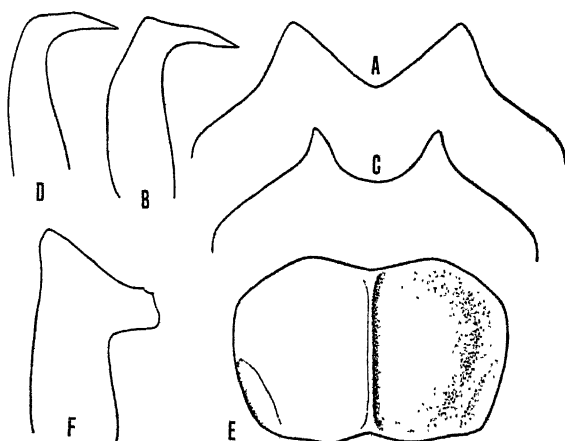
The figure of the male genital appendages accompanying the original description was somewhat inaccurate, as the type had been previously preserved in alcohol and the last tergite was distorted. I have now before me a second male of the same species taken in Tiberias, Palestine, 5. vii. 1931, submitted by Professor F. Bodenheimer. The specimen is identical with the type in every detail, and I present new figures of the last tergite and the cercus.

It will be seen that *P. philbyi* belongs to the *anatolica*-group of species, recently revised by me (Uvarov, 1934, Eos, x. p. 51), and differs strongly from other known species by the very short and broadly triangular lobes of the last tergite, as well as by the cercus, which is bent under a right-angle, with the apical part longer and more acute than in others. The general coloration of the present specimens is of the same dusty pale-brown shade, as in other members of the group. Unfortunately, the female of *P. philbyi* remains unknown, and no conclusion, therefore, can be reached of the relation of this species to *P. syriaca* Pictet described from the female sex only.

Paradrymadusa palæstina, sp. n.
(Text-figs. 2 C, D, E.)

This is another member of the *anatolica*-group, again different from others by the male cercus, which is roundly bent, with the apical part very long and acute. The lobes of the last tergite are more specialised than in *P. philbyi*, but distinctly shorter than in the other three species figured by me in the recent revision of the group (*t. c.*, text-fig. 4).

Text-fig. 2.



- A, *Paradrymadusa philbyi* Uv., ♂, last tergite; B, ditto, cercus;
C, *P. palæstina*, sp. n., ♂, last tergite; D, ditto, cercus;
E, ditto, ♀, subgenital plate; F, *P. annulicornis crenulata*, subsp. n.,
♂, cercus.

♂ (type).—Size under under medium for the genus, as in most members of the *anatolica*-group.

Fastigium of vertex, viewed from the front, pear-shaped, less than twice as broad above as below; upper surface weakly convex, without a sulcus.

Pronotum short, rounded, even in the metazona. Anterior margin very weakly concave; posterior broadly rounded-truncate; lateral lobes not vertical but sloping outwards.

Elytra short, parabolic, just reaching the third tergite.

Legs moderately long. Front femora with three, middle femora with four spines on the lower anterior

margin. (Hind legs missing in the type; for description see under paratype.)

Last tergite projecting behind, with an almost semi-circular emargination between the lobes, which are short, triangular and slightly outcurved. Cercus with the basal portion gradually narrowed and weakly incurved; the apical portion roundly incurved, long, tapering. Subgenital plate with a shallow and broad emargination.

Coloration as in other members of the group (e. g., as in *P. rammei* Uvarov, Ann. Mus. Zool. Acad. Sci. U.S.S.R. 1929, p. 634). Elytra with a few grey markings behind the radial vein.

♀ (paratype).—Hind femur armed with 7–8 fairly strong spines on each of the lower carinæ. Hind tibia with a series of black spots along the upper side. Seventh sternite approximately rectangular, weakly convex. Subgenital plate transverse, convex, with a distinct median carinula and shallow small lateral pits; apex very shallowly and broadly emarginate. Ovipositor almost twice as long as pronotum, strongly recurved.

Length of body, ♂ 26, ♀ 29; pronotum, ♂ 7, ♀ 8; hind femur, ♀, 25; ovipositor, ♀, 15 mm.

Described from a pair taken at Jerusalem, 11. ix. 1933 (*F. Bodenheimer*).

This species is nearest to *P. rammei* Uv., described from the country round Ankara, Turkey, but differs from it by the genitalia of both sexes.

Paradrymadusa annulicornis Uv. subsp. *crenulata*, nov.
(Text-fig. 2 F.)

A male of a fairly large *Paradrymadusa* taken by Mr. J. Palmoni on the eastern side of the river Jordan, near its emergence from the lake Gennesaret (Tiberias), should be referred to *P. annulicornis*, described by me from Haifa (Uvarov, 1922, Ent. m. Mag. 3rd ser. viii. p. 87), but represents a new subspecies differing from the typical form, as follows:—

♂.—Coloration greyish brown; the spines of legs marked with black spots; antennæ dark brown with narrow pale rings. Elytra shorter and more narrowly parabolic than in the typical form. Inner lobe of the cercus does not form an angle with its apical margin, and its posterior angle is provided with two denticles.

Lobes of the last sternite slightly longer and more excurved than in the typical form.

The whole shape of the male cercus in this specimen is very distinct from that in the typical form, while the crenulation of its lobe is certainly not accidental, being quite alike on both cerci. I, therefore, believe myself justified in describing a new subspecies.

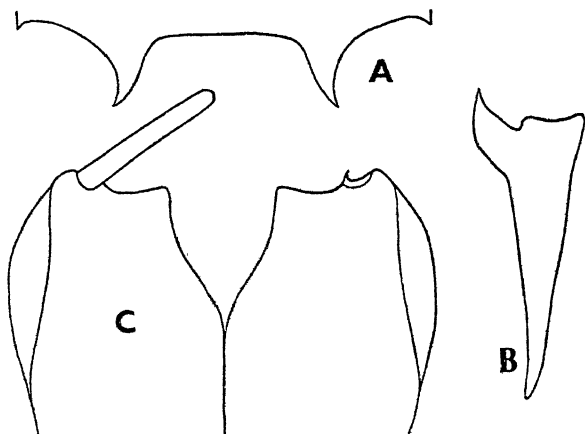
Pholidoptera ledereri hebræa, subsp. n.

(Text-figs. 3 A, B, C.)

Differs from the typical form (Beirut, Syria) by the following characters:—

♂.—Anal tergite fully chitinized, without a membranous area in the middle of posterior margin; appendages of the anal tergite placed more closely

Text-fig. 3.



Pholidoptera ledereri hebræa, subsp. n., ♂: A, last tergite; B, cercus; C, subgenital plate (the stylus on one side removed to show the basal spine).

to each other. Cercus with the tooth placed quite close to the base, not removed from it. Lobe of the subgenital plate with the posterior inner angle as distinct as in *Ph. chabrieri* (Charp.) and provided with a single spine at the base of the stylus. Elytra relatively long, black, with the posterior margin partly white.

Described from a male from the eastern bank of the river Jordan at the Lake Gennesaret (Tiberias), 1938 (*J. Palmoni*).

This insect presents a curious mixture of characters of *Ph. ledereri* and *Ph. chabrieri*. Indeed, its male subgenital plate is as in the latter, but with a single spine at the base of the stylus instead of two (none in *ledereri*). The cercus, on the other hand, has an inflated tooth similar in shape to that in *ledereri*, but placed basally as in *chabrieri*. It appears probable that all three insects should be regarded as members of a single "Artenkreis," but further data are necessary before their status can be definitely elucidated.

The differences of the new subspecies from the related forms can be easily appreciated from a comparison of my figures with those given by Ramme in his recent paper on the genus *Pholidoptera* (1930, Mitt. Zool. Mus. Berlin, xvi. pp. 798-822).

Metrioptera erecta, sp. n. (Text-fig. 4.)

♂.—A small and slender brachypterous species, easily recognizable by the erect acute lobes of the last tergite.

Head not wider than pronotum. Fastigio-frontal suture wider than the first antennal joint.

Pronotum with the disc weakly concave in prozona and more distinctly so in metazona, where low and broad lateral carinæ are formed as a result. Median carina well raised in metazona, absent in prozona. Transverse V-shaped sulcus distinct. Posterior margin moderately prominent, broadly rounded. Lateral lobe forming an obtuse rounded angle with the disc.

Elytra broadly rounded, short, reaching the apex of the first abdominal tergite. Main veins prominent.

Last tergite with a pair of closely approximated acute median lobes, which are directed almost vertically upwards, with their ends slightly decurved. Cercus large, straight, rounded, armed with a small hook in the apical fifth. Subgenital plate with an obtusely angular excision.

General coloration stramineous, with heavy brown-black markings. Face and cheeks stramineous, but densely mottled with reddish brown. Fastigium of vertex brownish above, with a pale median line continued on to the occiput and pronotum. Postocular fasciæ and

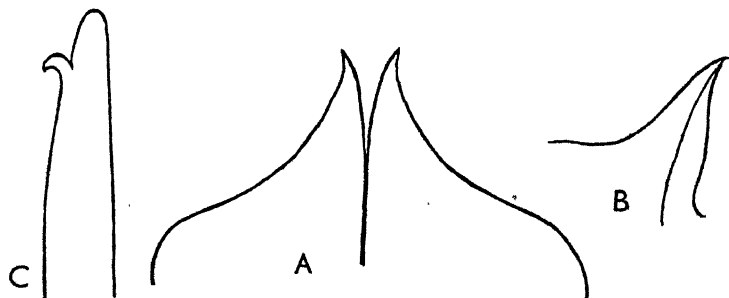
pronotal lateral lobes brown-black; the lobes with a sharply defined broad stamineous margin. Pronotal disc shaded with brown near the middle of anterior margin, on the sulci, and in metazona. Pleuræ and sides of abdomen with black fasciæ. All legs spotted with black. Posterior femur with a heavy black stripe along the middle of outer side, and a black streak near the base above; inner side with a black stripe. Abdomen below yellow.

Length of body 18; pronotum 5; elytra 3; hind femur 19 mm.

Described from one male taken at Ras el Ain, near Lydda.

Although the female is not known, there is no doubt that the species is new because of the peculiar structure

Text-fig. 4.



Metrioptera erecta, sp. n., ♂: A, last tergite; B, lobe of the last tergite in profile; C, cercus.

of the male genital appendages. Its affinity is not easy to establish until the female is discovered, but there is a considerable resemblance in the structure of pronotum and of the male genital appendages to the Anatolian *M. incerta* (Br. W.), of which *truncata* (Wern.) is a synonym. In *M. incerta*, however, the lobes of the last tergite are directed downwards, and the cercus and the shape of elytra are different from those in the new species.

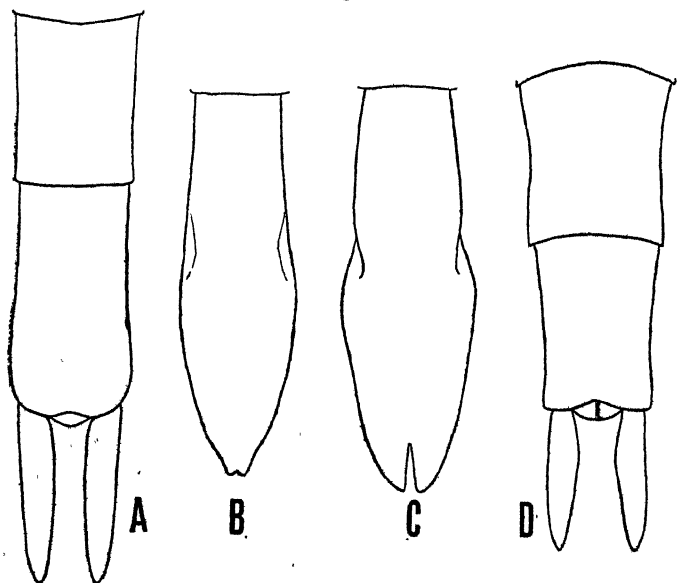
Metrioptera buxtoni Uv., described by me from Palestine from the female sex alone, has pronotum of entirely different type, viz., convex and without any trace of median carina even in metazona.

Phasmidæ.*Gratidia hebraica*, sp. n. (Text-figs. 5 A, B.)

♀.—Antennæ a little longer than head. Body smooth, with a faint median carinula on thorax. All legs unarmed. Front femur about twice as long as mesonotum. Last tergite apically broadly rounded, with a very shallow emargination. Operculum faintly constricted near the middle, with the apex shortly bilobate.

Total length 68; antenna 4·5; pronotum 3·5; mesonotum 13; metanotum 11; median segment 2; 8th

Text-fig. 5.



A, *Gratidia hebraica*, sp. n., ♀, end of abdomen from above; B, ditto, operculum; C, *Gratidia libanica* (Uv.), ♀, operculum; D, ditto, end of abdomen from above.

tergite 3; 9th tergite 2; 10th tergite 2·8; front femur 25; middle femur 16; hind femur 18 mm.

Described from a female taken at Mt. Carmel, 1938 (*J. Palmon*i).

The identification of this Phasmid presented some difficulty, because of its close resemblance to the one described by Pantel from the Lebanon under the incorrect

name *Bacillus ægyptiacus*, which has been changed by me to *B. libanicus* (Uvarov, 1924, Techn. Bull. Min. Agr. Egypt, xli. p. 8). The difficulty has not been lessened by the fact that Pantel referred his insect to the genus *Bacillus*, which implies the branching of the lower tibial carina. In the insect from Mt. Carmel the carina is not branched, and it therefore cannot be referred to *Bacillus*, in spite of its very close affinity to Pantel's species. It is fortunate that the actual specimens of Pantel are preserved in the Paris Museum, and I was able to examine them through the kindness of Dr. L. Chopard. The examination revealed some serious inaccuracies in Pantel's description. First of all, his insect is certainly not a *Bacillus*, as the tibial carinæ are also not branched apically, and I have no doubt that it should be referred to the genus *Gratidia*. Secondly, Pantel's description and figures of the operculum in both sexes are very inexact, since the apex of that structure is deeply incised in the female and very distinctly notched in the male.

Direct comparison of the female of *G. libanica* (Uv.), which I here designate as the type of the species, with the Mt. Carmel female revealed substantial differences in the terminal abdominal structures, as can be seen from the appended figures (text-figs. 5 C, D). I do not hesitate, therefore, to describe the Palestine insect as new, although its relation to several species of North-East Africa can be established only when the male becomes known.

Although *G. hebraica* is the first Phasmid species to be recorded from Palestine, the group is represented there also by another genus, since Bodenheimer (1935, Arch. Naturgesch. iv. p. 159) has briefly described a *Bacillus* sp., also from Mt. Carmel. The two specimens on which that description was based have been lost, but a figure made of one of them before the accident leaves no doubt that it was a true *Bacillus*, possibly related to *B. atticus* Br. W. Further collecting on Mt. Carmel is greatly to be desired for re-discovery of this species, as well as of the unknown male of *G. hebraica*.

EXPLANATION OF PLATE IX.

Fig. 1. *Xenomantis somalica* (Beier), ♂, type.

Fig. 2. *Xenomantis palmonis*, sp. n., ♀, type.

XVI.—*Solomon Islands* Trypetidæ.

By J. R. MALLOCH, Arlington, Va.

[Plates X. & XI.]

THERE are but a few species of this family known from these Islands, but as most islands have comparatively few species it is not to be expected that even intensive collecting will produce many here. In the present paper there are fourteen genera and twenty-nine species recorded*. C. H. Curran in 1936 recorded five species, all belonging to different genera, from the Solomons, three of these are in this collection, those that are not are *Rhabdochæta crockeri* Curran and *Paroxyna parca* Bezzi.

As this report is being made at the same time as a much larger report on the family from New Guinea and northern Australia, I do not include herein a key to the genera dealt with.

The materials upon which this report is based were sent to me by Sir Guy A. K. Marshall, Director of the Imperial Institute of Entomology, at my request, and will be returned to him. The types will be deposited in the British Museum.

Subfamily *DACINÆ*.

I accept this group as a subfamily and segregate Dacini and Adramini as tribes. Both tribes are represented in this collection.

Tribe *DACINI*.

An exhaustive study of the members of this tribe is essential to the clarification of the various proposed genera and subgenera. In the following key to the species I have included several such concepts, segregating them from each other on the basis of what appear to me to be the best available characters for this purpose without committing myself to a definite conclusion as to their validity.

DACUS Fabricius.

Syst. Antl. p. 272 (1805).

This genus, sens. lat., is by far the largest in point of numbers of those occurring in the Solomons, or at least

* Three of the species are not from the Solomon Islands.

in this collection. All the species, the life-histories of which are known, feed in their larval stages in fruits, some of them being quite destructive. No species is known from the Americas, all are from the Old World, with many species in Africa, one in Europe, and a large number in Asia, extending northward to Japan, with many being found in the Malayan region, India, and the Pacific Islands, the most southern records being from Australia. I believe it will yet be found feasible to separate the African species, or at least all but a few of them, from the Asiatic group containing *ferrugineus* Fabricius on the basis of the fused abdominal tergites of the former, but offer no generic groupings herein except those already proposed for the species now before me.

Of these proposed genera the most clearly offset from *Dacus* sens. lat. is *Callantra* Walker. Of the others *Bactrocera* Guérin, is differentiated merely on wing markings, and is not structurally differentiated from *Chætodacus* Bezzi as accepted for the Australian representatives of *Dacus* by Bezzi. There is no species of *Zeugodacus* Shiraki in the collection now before me, though there are at least two Australian species, *cucumis* French and *signatifer* Tryon, that appear to belong to the group. It is distinguished from the typical forms of *Chætodacus* by the possession of four scutellar bristles; most of the species have also the outer cross-vein distinctly dark clouded.

Key to the Species.

- | | |
|--|-----------------------------|
| 1. Wing with at least one dark brown fascia on the disc of the wing beyond the dark anal streak. | 2. |
| Wing with no well-defined outstanding dark discal fasciæ, usually with a dark costal streak of variable width and dark anal streak, sometimes preponderantly brown or black. | 5. |
| 2. No dark streak on the costal margin beyond the apex of the first vein, the central dark brown streak or fascia very narrow, enclosing both cross-veins, the latter separated by much less than the length of the inner cross-vein; humeri black. | <i>frauenfeldi</i> Schiner. |
| A dark streak on the costa to or beyond the apex of third vein; central dark fascia broad; humeri yellow. | 3. |
| 3. Wing with but one dark brown fascia, which covers both the cross-veins, the dark brown costal stripe widened apically, but not | |

- divided; cross-veins separated by less than the length of the inner one *unifasciatus*, sp. n.
- Wing with two dark brown fasciæ, the inner one covering both cross-veins, the outer one appearing as a branch from the broad costal stripe near apex of second vein; cross-veins separated by a distance much greater than length of the inner cross-vein. 4.
4. Prescutellar acrostichal bristles lacking; the dark fascia over the cross-veins large, broadly rounded over the outer cross-vein, narrowly connected with a dark fascia at base of the discal cell, and with a hyaline wedge into its anterior edge in the discal cell *peculiaris*, sp. n.
- Prescutellar acrostichal bristles present; the dark fascia over the cross-veins of moderate width, rounded out centrally and not connected with the dark fascia at base of the discal cell *umbrosus* Fabricius.
5. Prescutellar pair of acrostichal bristles lacking 6.
- Prescutellar pair of acrostichal bristles present 11.
6. Abdomen petiolate, with a short tubercle at each anterior lateral angle of basal tergite, in female with the dorsum highly arched on apical half, the lateral, or lower, margin straight when seen from the side, genital cone circular in cross-section; scutellum short, broadly rounded at apex, with two bristles (*Callantra* Walker) 7.
- Abdomen not petiolate, without tubercles at anterior extremity of basal tergite, in the female but moderately convex on apical half; scutellum longer, not regularly broadly rounded at apex, with two bristles (*Chaetodacus* Bezzi) 10.
7. The broad dark brown costal stripe touching fourth vein on its entire extent *æqualis* Coquillett.
- The dark brown costal streak fading out in the first posterior cell and not touching fourth vein on apical half or more of the wing 8.
8. Supra-alar bristle lacking *unicolor* Hendel.
- Supra-alar bristle present 9.
9. Thorax brownish black, with yellow marks on humeri, at suture laterally, on the hind margin of the mesopleura, on metapleura, and scutellum; abdominal petiole with yellow central and apical yellow fasciæ ... *smicroides* Walker.
- Thorax red, mesonotum irregularly blackened on disc, the postnotum black, the yellow marks as in *smicroides* but larger and brighter coloured; abdominal petiole lacking a central, but with a rather faint apical yellow fascia *solomonensis*, sp. n.
10. Wing blackish brown, with the alula, anal angle, anterior half or more of posterior

- basal cell, anterior half of basal half of the discal cell, and a central streak in third posterior cell that widens to margin, whitish hyaline; a mark on the costa on posterior half of first posterior cell and another on entire apex of second posterior cell yellowish hyaline; supra-alar present *pepisalæ* Froggatt.
- Wings much paler brown, the alula, anal angle, posterior basal and discal cell at base hyaline, the last gradually browned to apex; lateral margin of mesonotum yellow between humeri and posterior notopleural callus; supra-alar lacking *pagdeni*, sp. n.
11. Inner cross-vein of the wing narrowly dark brown clouded, very oblique and long, about one-fourth longer than outer cross-vein and nearly twice as long as penultimate section of fourth vein *obliquus*, sp. n.
- Inner cross-vein not narrowly dark brown clouded, neither very oblique nor nearly as long as outer cross-vein or penultimate section of fourth vein 12.
12. The dark brown costal stripe extending to, or almost to, third vein on its entire extent; fore coxæ black or dark brown at least in large part 12 a.
- The dark costal stripe not extending to third vein except sometimes at apex; fore coxæ yellow 13.
- 12 a. The dark costal stripe on the wing extending slightly over third vein on its entire extent; first posterior cell at outer cross-vein not twice as wide as distance between third vein and costa at anterior extremity of the cross-vein; all femora yellow, hind tibiæ pale brown *simulatus*, sp. n.
- The dark costal border falling short of attaining third vein by a mere line on part of its extent; first posterior cell at level of outer cross-vein over twice as wide as distance between third vein and costa at anterior extremity of cross-vein; all femora at least partly, and hind tibiæ black *varipes*, sp. n.
13. Large species, 8-9 mm. in length, with thorax black, the markings lemon-yellow; abdomen brownish yellow, with a black dorso-central line and some fainter basal and lateral blackish markings *froggatti* Bezzi.
- Smaller species, 4 mm. in length, reddish yellow in colour, with the usual pale thoracic markings yellowish white; abdomen reddish yellow, with a single small deep black spot at centre of anterior margin of the fifth tergite *unipunctatus*, sp. n.

I have included in the above key the Australian species *æqualis* Coquillett for comparative purposes only. *Callantra smicroides* Walker does not occur in the

Solomons so far as I know at this time, though I have seen it from New Guinea, and it was originally described from Celebes. It may be found elsewhere in this region.

I do not make use of the subgeneric names in the following text, though in the key the associations are given for the included species.

Dacus frauenfeldi Schiner. (Pl X. fig. 1.)

Novara Res. Dipt. p. 269 (1868).

A rather small black species, the thorax and abdomen coarsely piliferous punctate, appearing granulose, with the usual yellow markings on the thorax and abdomen, the latter reduced.

Frons brownish yellow, with a brown mark near anterior margin and blackish-brown dots at bases of the bristles, width about one-fourth that of head, three pairs of orbitals almost equally spaced, the upper pair reclinate, and four verticals, the anterior third of frons but little raised and almost bare. Upper occiput broadly blackened except on margin. Face with a pair of black spots, biundulate in profile. Antennæ descending below level of epistome, brownish yellow, third segment browned except at base, fully three times as long as second, the latter over twice as long as first. Postocular cilia rather noticeable for this group, consisting of about half a dozen short black bristles. Gena about as high as width of third antennal segment; palpi spatulate.

Thorax shiny black, the humeri usually black in male, more or less brownish or yellowish on lower half in female; posterior notopleural callus, a slender vitta behind the suture that tapers posteriorly, the scutellum except base and a more or less extended central prolongation of the black mark that may even extend to apex, the posterior half of mesopleura, a spot on upper edge of the sternopleura, and a bisected mark on the metapleura, bright lemon-yellow. All four scapular bristles quite long and strong, the scutellar pair stronger than any of the others, the entire bristling as in *Chaetodacus*. Mesonotum with a complete central grey dusted vitta, and a sublateral one on each side of it that is not as distinct nor complete.

Legs yellow, fore coxæ usually slightly browned, mid and hind pairs and their trochanters black, mid and hind femora in female usually infuscated, the mid pair

in centre, the hind pair at apices, hind tibiæ usually slightly browned, as are also the second to fourth segments of the fore tarsi.

Wings (Pl. X. fig. 1) hyaline, with a dark brown streak from opposite the humeral cross-vein to a little proximad of the apex of first vein that curves away from the costa and extends over the wing to hind margin, narrowly covering both the cross-veins, costa without a brown streak beyond apex of first vein; anal streak as wide as the central fascia, extending from base of anal cell along the sixth vein to margin. Inner cross-vein at about half its own length, or not over one-fifth the length of discal cell, from apex of latter; male with a slight notch in wing at apex of anal vein, and with some dense brown pile near apex of latter on upper surface of wing; subcostal cell slightly longer on costa than costal cell; fifth vein bare.

Abdomen black, with usually the apex of second tergite and two vittæ on dorsum from base of third tergite to apex reddish yellow.

Length 5.5–6.5 mm.

Rabaul, New Britain, a series of twenty-one specimens with the number D 275, reared from larvæ in ripe fruits of *Eugenia jambosa*, 14. x. 1934 (*J. L. Froggatt*); two specimens, no. D 35, reared from larvæ in mango fruits, 23. xii. 1931, same locality and collector as foregoing; one specimen, from same locality and host plant, by same collector, no. D 207, 6. iii. 1934; one damaged specimen, same locality, from fruit of *Eugenia jambosa*, no. D 273, 31. viii. 1934, same collector; Solomon Islands: Russell Is., one damaged specimen with puparium on same mount, no. 3305, *Pepisala*, 6. xi. 1934 (*R. A. Lever*). Originally described from Stuart Is.

The above description is given to facilitate identification of the species.

Dacus unifasciatus, sp. n. (Pl. X. fig. 2.)

Male.—Very similar to *distinctus* Malloch from Samoa, but the brown colour on the wing does not fill the entire anterior basal cell, there being a hyaline mark in the cell above the basal half of the discal cell (Pl. X. fig. 2).

Head yellow, face with two small glossy black spots, a minute dark dot at base of each of the supraorbital

bristles, a dark interocellar spot, and a large fuscous patch on each side of the occiput, and a small one below each eye. Frons about one-fourth as wide as head and over twice as long as wide, slightly raised in front, centrally fine haired, with two infraorbital and one supraorbital, verticals four. Third antennal segment slightly tapered to apex, over three times as long as second, faintly browned above. Face with the usual transverse depression below middle.

Thorax shiny black, mesonotum rather coarsely granulate, with a broad yellowish grey dusted central vitta that is faintly divided in front by a black line, the following parts lemon-yellow: humeri, lateral mesonotal margins, including the posterior notopleural calli, from the inner edges of which there extends a vitta to postalar calli that is tapered behind, a stripe over the posterior third of the mesopleura that extends on to upper edge of the sternopleura, a bisected mark on the metapleura, and the entire scutellum; propleura red. Surface hairs short, dense, and yellow. Bristles as in typical species of *Chætodacus*, black. Scutellum irregularly transverse between the pair of black bristles.

Legs, including all coxæ, honey-yellow, hind tibiæ and apices of all tarsi dark.

Wing as Pl. X. fig. 2, the markings dark brown, paler in costal cells. First vein setulose from base of node to apex above, third setulose from base to near apex above and less extensively below; fifth vein bare. Inner cross-vein shorter than outer, oblique, at less than its own length from apex of discal cell, the penultimate section of fourth vein less than half as long as the preceding section.

Abdomen orange-yellow, coarsely granulate, shiny, with a complete linear black dorsocentral vitta, and a broader black vitta on each side that tapers behind so that the yellow interspaces are of uniform width throughout. Depressed areas on fifth tergite large. Hairs mostly yellow. Third tergite with lateral apical fringe.

Length 5 mm.

Type, Guadalcanal, Kaukau, 18. viii. 1934, no. 211 (R. A. Lever).

Dacus peculiaris, sp. n. (Pl. X. fig. 3.)

Male.—A remarkable species that bears a strong resemblance to *pepissalæ*, but the wing-pattern is distinctly fasciate (Pl. X. fig. 3).

Head brownish yellow, with posterior portion of the convexity of frons dark brown, the interocellar area black, face with two quite large glossy black spots, a fuscous mark below each eye. Third antennal segment infuscated on outer side. Frons less than one-third of the head width, convexity in front quite marked, not very noticeably haired, two infraorbital and one supraorbital, and four verticals. Third antennal segment not three times as long as second. Palpi spatulate, brown.

Thorax dull brownish black, closely granulose, mesonotum with dense yellowish-grey dust forming four vittæ; the sublateral pair broader and more diffuse. The yellow markings as follows: humeri, posterior notopleural calli, two postsutural vittæ that extend to postalar calli, the scutellum except a narrow line across base, mesopleura on entire upper extent, the yellow mark gradually narrowed below to posterior lower angle where it is not half as wide as at upper margin, a mark on upper edge of the sternopleura, and a bisected mark on the metapleura. Bristles as in *unifasciatus*, except that the supra-alar is present and the scutellars are closer together. Surface hairs yellow.

Legs honey-yellow, all coxæ largely brown.

Wing as Pl. X. fig. 3, the markings dark brown. Inner cross-vein oblique, slightly sinuous, its lower extremity at middle of the discal cell. First vein setulose above from base of node to apex, third vein setulose on upperside to near apex, and at base below.

Abdomen shiny red, marked as in the preceding species, but the apex of the second tergite is almost entirely red, only narrowly black on lateral edges, and on the other tergites the black markings are wider, base of second tergite largely black. Hairs yellow. Depressions on fifth tergite very large. Fringe on third tergite, lateral.

Length 9.5 mm.

Type, Rabaul, New Britain, 28. viii. 1931, no. D 3 (*J. L. Froggatt*).

Dacus umbrosus Fabricius.

Syst. Antl. p. 276 (1805).

A very widely distributed species in the Malayan and Pacific Island regions.

Sometimes the markings on the wing are reduced, in at least teneral specimens, to mere outlines of the dark fasciæ, and I have examined examples in which even these were difficult to trace.

Solomon Islands: Tulagi, 8. ii. 1935, no. 4247 (*R. A. Lever*).

New Britain: Rabaul, three specimens, 7. ii. 1934, from over-ripe bread fruit, no. D 208 (*J. L. Froggatt*).

Nederland East Indies: Amboina, 1933 (*J. L. Froggatt*).

Recorded by Curran from Matema Island in the Santa Cruz group.

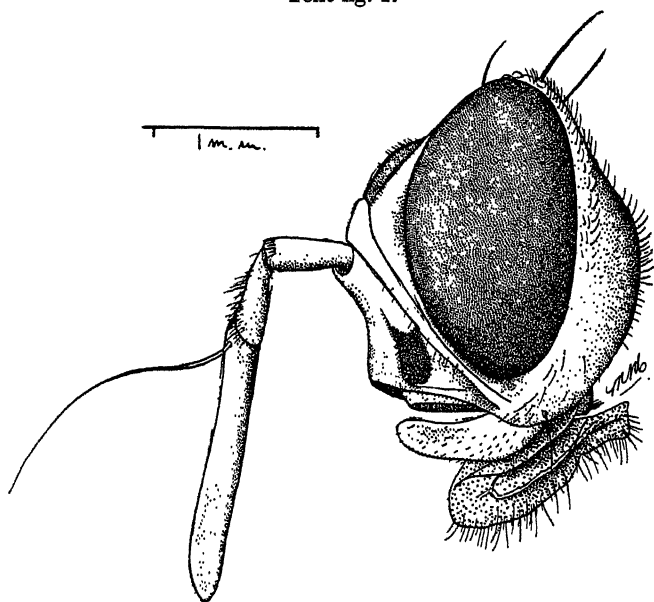
Dacus (Callantra) solomonensis, sp. n. (Pl. X. fig. 4.)

Female.—This the only species referable to *Callantra* Walker in this collection, though I have introduced all others known to me in the foregoing key to species. In addition to the characters used in the key for the segregation of the group to which it belongs, it may be noted that the mesonotum has a yellow streak across it from either side at the suture that almost connect on the central line in continuation of a similar streak on each mesopleura. This character I have not met with in any species of *Dacus* belonging to any of the other groups.

Head pale brownish yellow, darker in centre of frons in front, on interocellar area, and on a small mark below each eye; face with two glossy black spots. Frons about one-third of the head width and a little longer than wide, depressed behind the anterior convexity, no infra-orbitals and a small pair of supraorbitals present, verticals short, four. Antennæ elongate, situated on a slight eminence, elbowed at apex of first segment, this subequal to second, the latter on inner side about one-fourth as long as third, the third slightly widened from near base to near apex, then narrowed to apex, the tip more angulate below than above; face evenly concave centrally in profile (text-fig. 1). Palpi spatulate, with microscopic black hairs.

Thorax reddish brown, disc of mesonotum largely black, red in centre in front and posteriorly on sides, the following parts yellow: humeri, a rather broad streak beginning on upper edge of the sternopleura and extending over the posterior third of the mesopleura and posterior notopleural calli to near the central line of the mesonotum, a large spot below and a small one above the impressed line on the metapleura, and the scutellum. These markings may be reddish yellow in dead specimens.

Text-fig. 1.



Dacus solomonensis, sp. n. Head in profile. $\times 21$.

Surface hairs short and dark, the surface closely pitted or granulose, bristles as in *Chætodacus*, except that the prescutellar acrostichals are lacking; scutellum broadly and evenly rounded, with many surface hairs and two strong black apical bristles. Postnotum shiny black.

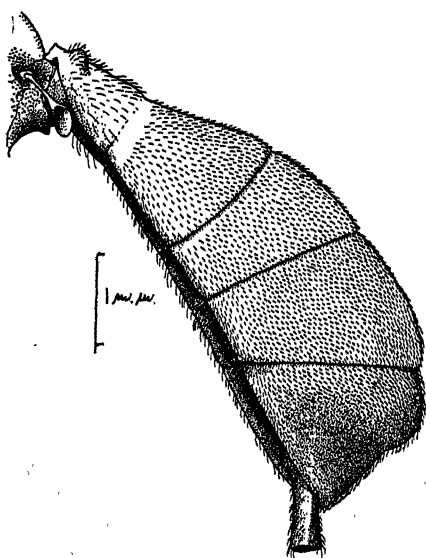
Legs honey-yellow, all coxæ browned.

Wing subhyaline, with a broad smoky-brown costal streak on entire extent that fades out before attaining fourth vein on field, and a smaller similarly coloured

streak from base of anal cell to its apex that spreads into third posterior cell (Pl. X. fig. 5). Wing narrower than usual, with the anal angle reduced, inner cross-vein close to apical third of the discal cell, slightly oblique, outer cross-vein sloping outward at anterior extremity, at about 1.25 times its own length from inner. Bristling of the veins as in *D. unifasciatus*.

Abdomen reddish brown, shiny, apex of second tergite yellow, surface with close piliferous punctures, the pile

Text-fig. 2.



Dacus solomonensis, sp. n. Abdomen of female from the side. $\times 12$.

yellow and depressed, shortest in the large depressions on the fifth tergite. Abdomen in profile as text-fig. 2, the sutures distinct but not mobile.

Length, exclusive of ovipositor, 12 mm.

Guadalcanal: *Type*, Lunga, 9. vii. 1933, *paratype*, Bonu, 13. xii. 1934, 1200 feet (*R. A. Lever*).

Dacus obliquus, sp. n. (Pl. X. fig 5.)

Male and Female.—A rather small very dark species, with the exceptionally long oblique inner cross-vein

narrowly dark brown clouded, so that it resembles in some degree *frauenfeldi* Schiner. Though there is a very faint indication of a pale brown clouding on the penultimate section of fourth vein, and also on the outer cross-vein, the specimens before me are rather teneral and therefore, in all probability, are not as fully coloured as mature specimens, the species can hardly be considered as a *Bactrocera*. The exceptionally long and oblique inner cross-vein ends in the fourth vein closer to the outer cross-vein than in most species of *Chætodacus*, and in this respect also it resembles *frauenfeldi*.

Head brown, upper and lateral edges of face narrowly, and the genæ brownish yellow, remainder of face glossy deep black; frons dull yellowish brown. Antennæ brownish yellow, the third segment except its base fuscous; palpi brown at bases, the apices yellow. Frons about one-fourth of the head-width and twice as long as wide, not noticeably convex in front, with two infra-orbitals and one supraorbital, all short. Basal antennal segment shorter than second, the latter on inner side about one-third as long as third, the third parallel-sided, rounded at apex, extending slightly below level of lower margin of head. The four vertical bristles much longer and stronger than the orbitals.

Thorax shiny black, coarsely granulose, with a divided densely grey dusted dorsocentral vitta, and on each side of latter near lateral margins another similar but less distinct and broader vitta; centre of mesonotum in front reddish, the following parts yellow: posterior notopleural calli, sides of the scutellum, posterior half of the mesopleura, narrower below, a small spot on upper edge of the sternopleura, and a bisected metapleural mark; the humeri brownish yellow. Scapulars long, other bristles as in typical species of *Chætodacus*. Surface hairs white. Scutellum with two rather closely placed bristles, the apex transverse between them.

Legs black or very dark brown, bases of all femora broadly, and all metatarsi entirely, yellow.

Wing (Pl. X. fig. 5) hyaline, with a pale yellowish-brown streak on the costa from apex of the subcostal vein to a little beyond apex of third that does not extend over the second vein nor connect with the dark edging on inner cross-vein, anal streak pale brown, the inner

cross-vein narrowly dark brown clouded, penultimate section of fourth vein and the outer cross-vein faintly yellowish brown clouded. First vein setulose on upper side from base of node to apex, third setulose from base to near apex on upper side and on basal half below.

Abdomen black, shiny, rather coarsely piliferous punctate or granulose, with quite dense decumbent pale hairs. Male with the usual fringe on lateral portions of apex of third tergite, the bristles black or dark brown.

Length 6-7 mm.

Type, female, and *allotype*, Admiralty Islands, March 1932, from native fruit, no. D 93 (*J. L. Froggatt*).

I usually select a male as type-specimen, but the only male available has the abdomen badly broken, and though the female lacks part of one wing it is the better specimen of the two.

Dacus varipes, sp. n. (Pl. X. fig. 6.)

Male and Female.—Superficially resembling *froggatti* Bez., but much darker in colour, the abdomen except apex of second tergite, and the legs partly, black, while the brown costal stripe is darker and broader.

Head testaceous yellow, face with two black spots, frons with a black dot at base of each bristle and a brown mark on the raised central part near anterior margin, vertex and a large part of occiput black. Antennæ with the third segment in female largely or entirely brownish black; bases of palpi infuscated. Orbitals 3; second antennal segment about one-third as long as third; palpi spatulate.

Thorax rather dull black and distinctly granulose, the following parts lemon-yellow:—Humeri, posterior notopleural calli, a vitta each side of disc from suture that ceases well before postalar callus and is tapered behind, posterior half of the mesopleura, a small spot on upper edge of the sternopleura, a subdivided spot on the metapleura, and the scutellum except narrowly across base centrally. Bristles as in typical *Chætodacus*. Hairs pale. Mesonotum with a broad grey dusted divided central vitta and a similar but less evident vitta on each side of it. Apex of the scutellum not emarginate.

Legs black, fore tibiæ brown, mid tibiæ paler, basal half or more of hind femora, basal segment of fore and all of mid and hind tarsi orange-yellow.

Wings (Pl. X. fig. 6) hyaline, with a dark brown costal stripe that ends at middle of first posterior cell and extends to or almost to the third vein on entire extent, the costal cell paler; anal streak broad, black-brown, as in *froggatti* Bez.; inner cross-vein not at all clouded in either sex. Outer cross-vein about two-fifths from apex of discal cell. Halteres yellow.

Abdomen black, granulose, with a narrow orange-yellow apex to the second tergite, the hairs white, fringe on third tergite of male black. Depressions on fifth tergite of male large and shallow.

Length 7.5–8.5 mm.

Type, male, and *allotype*, Tulagi, December 1932. *Paratypes*, 2 females, Mala Su'u, 14. v. 1934 (*R. A. Lever*.)

Dacus simulatus, sp. n.

Male.—Very similar to *varipes*, differing in having the sublateral yellow mesonotal vittæ broader, and although all the coxæ and trochanters are black the femora are brownish yellow, the hind tibiæ are brown, as are also the apical four segments of the fore tarsi. The costal streak is dark brown and much broader, extending slightly over the third vein on its whole extent, most noticeably so apically, and the anterior extremity of the inner cross-vein is slightly brown clouded. The inner cross-vein is almost at the middle of the discal cell. In other respects similar to *varipes*.

Length 9 mm.

Type, Nggela Is., Mali Ali Valley, 26. iii. 1934 (*H. T. Pagden*).

Dacus froggatti Bezzi. (Pl. X. fig. 7.)

Dacus zonatus Froggatt, nec Saunders, Proc. Linn. Soc. N.S.W. xxxv. p. 868 (1910).

Dacus froggatti Bezzi, n. n., Dipt. of Fiji, p. 101 (1928) *.

This species is quite distinct from the Indian species which Froggatt confused it with.

Head orange-yellow, face with two black spots, frons with small brown dots at bases of the bristles, the orbitals three in number. Second antennal segment about one-third as long as third.

* I can find no other reference to this name in the literature.

Thorax dull brownish black, the pale parts lemon-yellow as follows:—Humeri, postalar calli, a vitta from the suture to postalar callus tapered slightly behind, the scutellum, posterior half of the mesopleura, a spot on the upper edge of the sternopleura, and a divided mark on the metapleura. Bristling typical for *Chætodacus*.

Legs including the coxæ yellow.

Wings (Pl. X. fig. 7) hyaline, with a pale brown costal stripe from apex of the subcostal vein to a little beyond apex of third vein, not extending noticeably over second vein on field, anal streak covering the anal cell and extending to apex of anal vein, the usual dense dark brown hairs and notch in margin in male. In the same sex there is a very slight pale brownish clouding on both the cross-veins that is not visible in the female.

Abdomen red, base of composite segment broadly, of third narrowly, blackened, third to fifth tergites inclusive with a central line and the sides rather broadly blackened.

Length 8–9 mm.

Male, Tulagi, female, Guadalcanar. Froggatt recorded it from Russell Island. I have seen a specimen from New Britain (*F. H. Taylor*).

Dacus pepisalzæ Froggatt. (Pl. X. fig. 8.)

Proc. Linn. Soc. N.S.W. vol. xxxv. p. 869 (1910).

Head orange-yellow, face with two glossy black spots, frons with a dark mark on each orbit in front, and a dark dot at base of each bristle, a black streak across the vertex, upper third of each orbit, a small dark spot below each eye, the centre of frons near its anterior margin raised, browned, and with numerous short stiff dark hairs that are a little more noticeable than in most other species though not bristles. Each orbit with three almost equally strong regularly spaced bristles, vertex with four strong bristles. Gena about twice as high as width of third antennal segment; face biundulate in profile. Second antennal segment twice as long as first and almost half as long as third, with a rather strong black bristle above beyond middle.

Thorax black, coarsely granulose, shiny, humeri except their anterior edges, the postalar calli, a vitta from suture

to postalar callus, tapered behind, the entire scutellum, posterior half of the mesopleura, narrowed below, and a metapleural mark above and below stricture, bright lemon-yellow. Mesonotum with dense microscopic golden pile, seen from behind forming a broad central vitta and less distinct sublateral vittæ. Bristles as follows: 2 notopleural, 1 supra-alar, 2 postalar, 1 mesopleural, 1 pteropleural, the last two fine. Prescutellars lacking. Scutellum slightly emarginate at apex centrally, with a bristle on each side of emargination.

Legs orange-yellow, mid and hind coxæ black. Sensory area on hind tibia not conspicuous, that tibia with a series of short fine anterodorsal setulæ.

Wing (Pl. X. fig. 8) dark brown, fading into yellow basally, the alulæ, anal angle almost to the anal vein, a streak in third posterior cell from base to apex widened apically, anterior half or more of posterior basal cell, anterior half of basal half of discal cell, hyaline, apex of first posterior cell on posterior half, and apex of second posterior cell broadly subhyaline. Inner cross-vein about one-third from apex of discal cell; fifth vein bare. Halteres yellow.

Abdomen shiny black, more finely granulose than the mesonotum, the composite basal tergite orange-red across centre and at apex, broadly so centrally at apex. Hairs on basal tergite yellow, beyond that black, apex of third tergite of male with a fringe of black setulose hairs except centrally. Depressions on fifth tergite broad and shallow.

Length 12 mm.

One male, Tulagi, 26. x. 1934 (*R. A. Lever*).

Originally described from Russell Island.

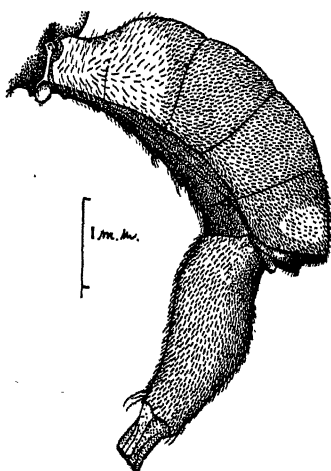
Dacus pagdeni, sp. n. (Pl. X. fig. 9.)

Female.—This species is one of the intermediate forms that strengthens my attitude in refraining from the adoption of even subgeneric status for the groups of species in this genus. It has some of the characters of *Callantra*, but lacks the definite petiole to the abdomen and the anterior lateral tubercles of the basal tergite, has the abdomen with the apical half much less elevated and rounded above, and the scutellum more elongate and not as broadly and evenly rounded in outline. The lack

of prescutellar acrostichals and the broadly browned costal margin of the wing indicate an affinity with *Callantra*, but there is no supra-alar bristle, and the other characters leave me undecided as to the exact relationship in the complex.

Head orange-yellow, browned on upper occiput, ocellar dot, the convex portion of the anterior half of frons, and below each eye, the face with a pair of glossy deep black spots. Frons about one-third of the head-width and nearly twice as long as wide, each orbit with three

Text-fig. 3.



Dacus pagdeni, sp. n. Abdomen of female from the side. $\times 12$.

fine infraorbital and one stronger supraorbital, anterior half bulged up centrally so that the minute dark hairs are more evident than usual, verticals 4. Face in profile with a transverse depression below middle. Third antennal segment fully three times as long as second on inner side.

Thorax deep brownish black, with dense microscopic yellow hairs, most conspicuous on mesonotum where they form, when seen from behind and to one side, two central vittæ; the following parts lemon-yellow:—Humeri, lateral margins of mesonotum to bases of wings, three

rather inconspicuous incomplete postsutural vittæ, the entire scutellum, posterior half of the mesopleura, a spot on upper edge of the sternopleura, and a large mark on the metapleura above and below the oblique depressed line. Scapular bristles distinct, the prescutellar acrostichal and supra-alar bristles lacking. Scutellum densely short yellow haired, with two strong black apical bristles.

Legs orange-yellow, mid and hind coxæ black.

Wing (Pl. X. fig. 9) moderately dark brown, paler along centre from base, whitish hyaline in posterior basal cell, on anal angle and the alula, subhyaline at base of discal cell, becoming darker to apex. Inner cross-vein at a little over one-third from apex of discal cell, slightly oblique, its anterior extremity almost below apex of first vein, its posterior extremity about twice its own length from outer cross-vein; outer cross-vein slightly sinuous. Halteres yellow.

Abdomen black, slightly shiny, finely granulose, with quite dense yellow hairs, apices of second and fifth tergites appearing slightly reddish, genital sheath reddish below and on sides, with short black hairs, in profile with a quite noticeable hump at middle (text-fig. 3).

Length, including sheath of ovipositor, 13 mm.

Type, Tulagi, ridge, 31. iii. 1934, no. 1509 (*H. T. Pagden*).

Dacus unipunctatus, sp. n.

Male.—An unusually small pale coloured species, with only a pale yellowish-brown costal streak, the thorax and abdomen honey-yellow, the latter with a deep black spot near anterior central margin of the fifth tergite.

Head yellow, face paler, whitish, with a small black spot on each side near epistome; hairs and bristles yellow. Frons a little less than one-third of the head width and about twice as long as wide, slightly widened in front, with two infra- and one supra-orbital, all fine and short, four verticals, and the surface hairs longer than usual, all hairs and bristles yellow. Third antennal segment barely over three times as long as its basal width, tapered to the rounded apex, second segment about one-third as long as third.

Thorax honey-yellow, humeri, posterior notopleural calli, two short postsutural vittæ, the scutellum, posterior half of mesopleura, and a spot below the impressed line

on the metapleura, ivory white. Scapular bristles strong, all bristles as in *Chætodacus*, the supra-alars short and fine; scutellum with a pair of yellow bristles on slightly raised bases, the apex transverse between them.

Wing hyaline, veins yellow, costa narrowly pale brown from apex of the subcostal cell to a little beyond apex of third vein; anal streak very faint. Inner cross-vein almost erect, at about two-fifths from apex of the discal cell; free part of anal vein longer than lobe of anal cell.

Abdomen ovate, regularly convex on dorsum, entirely pale honey-yellow except the deep black spot in centre of the anterior margin of the fifth tergite, the latter without well-defined lateral discal depressions. All hairs pale yellow, the bristles on lateral apical portions of third tergite brownish yellow.

Length 4.5 mm.

Type, Tulagi (*R. A. Lever*).

One wing is missing from the type-specimen, but it is otherwise in good condition, though a little teneral. The wing may be more distinctly marked along the costa in mature specimens.

Tribe ADRAMINI.

The members of this tribe are readily distinguished from those of Dacini by their more slender form, the narrower posterior basal cell of the wing, shorter antennæ, subplumose aristæ, and in the present genus by the presence of short stout spines on the apical portion of the ventral surfaces of the mid and hind femora and usually also on the fore femora. The mid femora in *Adrama*, the only genus in the present collection, are much thicker than either of the other pairs, and are also more extensively spinose below.

There is a striking similarity in the species of *Adrama*, and below I give a full description of but one of the three new forms with comparative notes under the other two, this being deemed sufficient to distinguish the species.

ADRAMA Walker.

Proc. Linn. Soc. Lond. vol. iii. p. 118 (1858).

There is a group of species in this genus in which the entire pleura, postnotum, and scutellum are reddish

yellow, or red, usually with the pale yellow markings common to the genus, but entirely without black marks. So far as I have seen this group is found in only New Guinea and the Solomon Islands, but other species may yet be met with in adjacent island groups. In the present collection there are three species, all of them distinct from the one I have seen from New Guinea. Below I present a key to these species.

Key to the Species.

1. Mesonotum with the presutural area except the humeri black, a faint reddish central vitta, on posterior half on which the hairs are yellow in continuation of the yellow central vitta that divides the two broad but incomplete black postsutural vittæ, the hairs on the black parts black, on pale parts yellowish; face with a pair of small black marks on lower edge; wing with a dark fascia from about middle of discal cell to costa over the inner cross-vein, and another over outer cross-vein from hind margin to third vein, beyond the latter of which fasciæ the apical portion of the wing is fuscous clouded; inner cross-vein about one-third from apex of discal cell *centralis*, sp. n.
- Mesonotum entirely reddish yellow or red, without black markings; face without black spots; tip of wing beyond outer cross-vein almost uniformly infuscated 2.
2. Inner cross-vein dark clouded, situated in a faint but evident dark fascia, and about two-fifths from apex of the discal cell *rufithorax*, sp. n.
- Inner cross-vein not clouded and not in a dark fascia, at or close to middle of the discal cell . *fuscoapicata*, sp. n.

Adrama centralis, sp. n. (Pl. X. fig. 10.)

Male and Female.—Very similar to *papuaensis* Malloch, except that in the latter the mesonotum is almost entirely glossy black, with no sutural pale vitta, the hairs black, and a sharply-defined postsutural central vitta bright lemon-yellow.

Head red or orange-yellow, with two small glossy black spots on lower edge of face, and a small velvety-black spot on anterior margin of frons, upper third of frons, to level of the bases of supraorbital bristles, distinctly shiny, the remainder of surface dull, the shiny part appearing darker than the other. Two pairs of fine infraorbitals close to anterior margin and a stronger pair of reclinate supraorbitals about the upper third,

vertex with a pair of stronger bristles. Other characters normal.

Thorax reddish yellow to red, mesonotum with the presutural area except the humeri and posterior notopleural calli shiny black, centrally with a reddish vitta, postsuturally with two broad black discal vittæ that are narrowly separated by a red line at suture from the presutural black marks, the central red vitta both presuturally and postsuturally with dense golden-yellow hairs, the hairs on the black parts black, the others yellowish. Humeri, posterior half of the mesopleura, and a large mark on the metapleura lemon-yellow; scutellum reddish yellow. Humeral, sternopleural, and pteropleural bristles, lacking as usual, the following bristles present: 2 notopleurals, 1 supra-alar, 2 postalars, 1 weak upper mesopleural, and four scutellars, the basal pair close to base, the apical pair on apical angles.

Legs reddish yellow, fore tibiæ and tarsi and bases of hind tibiæ dark brown. Fore femur with one preapical posteroventral black spine; mid femur much thicker than the others, with two series of short black spines on apical half or more, one on the anteroventral and the other on the posteroventral surface; hind femur with three or four short black spines on the apical fourth of anteroventral and posteroventral surfaces.

Wing (Pl. X. fig. 10) brownish hyaline, veins dark brown, stigma and cell below it yellowish brown, a narrow dark brown fascia from the costa over inner cross-vein to or beyond the middle of discal cell, and a similar fascia from lower extremity of the outer cross-vein to third vein, the apex of wing beyond the latter paler brown, slightly darker to costa. Inner cross-vein about one-third from apex of the discal cell; setulæ on first vein extending from close to base to apex on upper side, on third vein from base to inner cross-vein or slightly beyond it above, and at extreme base below. Halteres reddish yellow.

Abdomen entirely shiny reddish yellow, rather densely covered with piliferous punctures, the pile short and pale. Composite basal tergite as long as the next two combined, fifth longer than fourth in male, with rounded apex and some weak marginal bristles at apex, in female the sixth tergite is shorter than the fifth, the sheath

of the ovipositor is conical, about as long as the preceding three segments combined, with quite dense short brown hairs.

Length 12–13 mm.

Type, male, Guadalcanal: Kovagombi, 1. v. 1936, no. 5783 (*R. A. Lever*). *Allotype*, Guadalcanal: Lavoro, 3. ix. 1934, no. 3160 (*H. T. Pagden*). *Paratype* male, same data as type.

Adrama rufithorax, sp. n. (Pl. X. fig. 11.)

Male.—Similar to *centralis* in general coloration and structure, differing in the lack of black spots on the face, black marks on the mesonotum, and the more uniformly pale brown wing markings.

Frons as in *centralis*, but the two pairs of infraorbital bristles are more widely separated and the distinctly shiny part of the frons is more extensive, covering all the surface except the black anterior spot, though not as distinctly shiny in front.

Entire mesonotal hairing black.

Legs as in *centralis*.

Wing (Pl. X. fig. 11) more uniformly pale brown, in the type yellowish brown, becoming gradually darker from base to inner cross-vein, where there is an indistinct darker fascia much as in *centralis*, between which and the apical brown portion there is a large irregular hyaline patch in basal third of the first posterior and apical third of discal cells. Inner cross-vein at about two-fifths from apex of discal cell. Setulæ on first and third veins as in *centralis*.

Abdomen reddish yellow, the short hairs pale brown, fifth tergite about 1.25 times as long as fourth, weakly bristled at apical lateral angles.

Length 10–11 mm.

Type, Russell Is., Lingatu (*R. A. Lever*). *Paratype*, topotypical, 1932 (*R. A. Lever*). The paratype is teneral and not fully coloured.

Adrama fuscoapicata, sp. n. (Pl. X. fig. 12.)

Male.—Similar in general colour and structure to the two species described above, agreeing best with *rufithorax* in the lack of black spots on the face and black markings on the mesonotum.

The frons is as extensively shiny as in *rufithorax*, only the anterior black spot being dull. There are three infraorbitals on one side and two on the other in the type, the paratype lacks the head.

Mesonotal hairs black, bristles as in the other two species, the yellow marks rather faint.

Legs as in *centralis*, the hind tibiæ more extensively blackish brown.

Wing (Pl. X. fig. 12) brownish hyaline, the stigma brownish yellow, no dark fascia at inner cross-vein, apex from before outer cross-vein smoky brown, sometimes paler in centre of some of the cells and on costa beyond apex of second vein. Inner cross-vein at middle of the discal cell.

Abdomen as in *rufithorax*.

Length 11 mm.

Type, Guadalcanal: Oreke, 700 feet, 13. xii. 1934, no. 3094. *Paratype*, Guadalcanal: Popanu, 500 feet, 15. xii. 1934, no. 4091 (*R. A. Lever*). The paratype is much broken, the head and part of wings being lacking.

Subfamily TRYPETINÆ.

XANTHOTRYPTETA, gen. nov.

Generic characters.—Similar to *Euphranta* Loew in having the upper portion of the metapleura above the impressed line with numerous erect fine hairs, but differs in having no sternopleural bristle. The frons is entirely shiny, with microscopic ocellar and postvertical bristles, two pairs of strong incurved infraorbital and one pair of strong supraorbital bristles, the latter about half as far from the upper infraorbital as the latter is from the lower. Arista long haired. Presutural bristle lacking.

Genotype, the following new species.

Xanthotrypteta bimaculata, sp. n. (Pl. X. fig 13.)

Female.—Rather similar in general appearance to some species of *Adrama*. General colour reddish yellow or ferruginous, distinctly shiny.

Head unicolorous ferrugineous, shiny, the face glossy, frons with a dark central vitta, the interocellar spot black. Frons about one-fourth as wide as head and 1.5 times as long as wide, slightly widened in front. Eye erect, about 1.25 as high as long and slightly narrowed below. Face rather deeply concave across centre, not

visible from side except at epistome, which is distinctly protruded. Gena not as high as width of third antennal segment, the latter about three times as long as wide, slightly tapered to the rounded apex; longest hairs on arista as long as width of third antennal segment; proboscis stout and short; palpi spatulate.

Thorax shiny, with an elongate black mark above each humerus, mesonotal hairs black, pleural hairs mainly yellow. Bristles as follows: 1 humeral, 2 notopleurals, 1 supra-alar, 2 postalars, 1 mesopleural, and four scutellars. Scutellum flattened, subtriangular, with four strong bristles and many minute black hairs.

Legs coloured as body, the hind tibiæ browned in large part, no bristles on the femora, mid tibia with a strong apical ventral spur, hind tibia with the anterodorsal setulæ rather indistinct, black.

Wing (Pl. X. fig. 13) yellowish hyaline, more conspicuously so costally, veins dark brown, a diffuse brown oblique fascia from the stigma over the inner cross-vein that connects with the large blackish-brown mark on apical half, the latter discontinued on a line along the middle of apical half of discal cell, a narrow hyaline mark across the apex of the first posterior cell and a triangular one in second posterior cell close to the outer cross-vein. Inner cross-vein at or slightly before middle of discal cell and below apex of first vein, first posterior cell widened slightly to apex. First vein setulose from close to base to tip above, and at apex below, third vein setulose above from base to midway to inner cross-vein and at base below, other veins bare. Lobe of anal cell short triangular.

Abdomen elongate oval, finely piliferous punctate, the hairs short, black, depressed. Sixth tergite distinctly shorter than fifth; genital cone black at apex, haired as remainder of abdomen.

Length 8-9 mm.

Type and *paratype*, N. Georgia, Segi, no. 6152, coco-nut husk, 4. viii. 1936 (*R. A. Lever*).

EUPHRANTA Loew.

Europ. Bohrf. p. 28 (1862).

Lagarosia van der Wulp, Tijdschr. v. Ent. vol. xxxiv. p. 210 (1891).

I can find no characters to substantiate the claim to segregation of *Lagarosia* from typical *Euphranta*, and accept them as the same genus.

Euphranta scutellata, sp. n. (Pl. XI. fig. 14.)

Male and Female.—A shiny black species with the wing markings similar in type to those of *lacteata* van der Wulp. Distinguished from all the species known to me by the preponderantly yellow scutellum and the presence of a large pale yellow mark on the middle of the postsutural area of the mesonotum.

Head testaceous yellow, centre of frons broadly browned, the occiput, except in centre behind the ocelli glossy black, face with a black mark along inner side of each fovea, sometimes darkened centrally. Antennæ brownish yellow, third segment largely brown; palpi brownish yellow. Frons about one-third of the head-width, and 1.5 times as long as wide, smooth and shiny, depressed down centre, the surface hairs quite long and pale, two pairs of strong incurved infraorbitals, the upper one but little in front of and much nearer eye than the single stronger and longer pair of reclinate supraorbitals; verticals 4; ocellars microscopic, the postverticals larger but short and fine; postocular cilia fine and black. Eye higher than long, narrowed below, gena about as high as width of the third antennal segment, the latter over four times as long as its basal width, tapered to the rounded apex; longest hairs on arista about as long as central width of third antennal segment; palpi spatulate. Antennæ extending to epistome, the latter noticeably angular, face concave in profile.

Thorax shiny black, with grey dust that is most conspicuous on a broad central vitta and a similar fascia at suture on the mesonotum and on posterior half or more of the mesopleura. Propleura brownish, a yellowish-brown streak in lateral parts of the suture; postsutural area with a large obcordate pale yellow mark in centre; scutellum pale yellow, slightly browned across base. Hairs on mesonotum largely black, yellow laterally, those on pleura largely yellow. Central scapulars short and fine, laterals much stronger, other bristles as follows: 1 humeral, 2 notopleurals, 1 supra-alar, 2 postalars, 2 mesopleurals, 1 pteropleural, 1 sternopleural, and 4 scutellars. Scutellum flat above, subtriangular, with microscopic pale hairs.

Legs black, fore pair, all trochanters and tarsi brownish yellow, fore femora at apices and tibiæ at bases blackened,

hind femora in female yellow on basal fifth. Mid tibia with a strong black apical spur; hind tibia with the anterodorsal setulæ short and fine; fore femur with one or two fine posteroventral bristles on apical third.

Wing (Pl. XI. fig. 14) whitish hyaline, the markings black-brown, the same in both sexes. Inner cross-vein a little before middle of the discal cell, first posterior cell widened slightly at apex; first vein setulose from a little basad of node to apex on upper surface, third setulose from base to or a little beyond inner cross-vein on upper surface, and at base below. Halteres pale yellow.

Abdomen elongate ovate, broader in male than in female, glossy black, with black hairs and a few short black bristles at apices of the fourth and fifth tergites. Fifth tergite of male narrowed to apex, about 1.5 times as long as fourth; sixth tergite of female not shorter than fifth; sheath of ovipositor conical, over half as long as the remainder of the abdomen, black haired.

Length 8.5–10 mm.

Type, male, and *allotype*, mounted on the same pin, Solomon Islands, May 1932 (*R. A. Lever*).

NEOTHEMARA, gen. nov.

Generic characters.—Face almost vertical in profile or with the epistome slightly projecting; antennæ to or a little below middle of face; frons with two pairs of incurved infraorbital and two pairs of reclinate supra-orbital bristles, the anterior pair of latter at or a little above middle of frons, the posterior pair a little the shorter, ocellars minute and hair-like; verticals four; postverticals short. Thorax with scapulars weak, propleural hairs setulose, the bristles as follows:—1 humeral, 2 notopleurals, 1 presutural, 1 supra-alar, 2 postalars, 1 pair of dorsocentrals well behind the line of the supra-alars, 1 pair of acrostichals, 2 mesopleurals, 1 pteropleural, and 1 sternopleural; scutellars 6, almost equally strong. First wing-vein setulose from apex of node to apex above, third setulose from base of petiole to beyond level of the outer cross-vein above and below; second vein distinctly undulated below or just beyond apex of first vein; veins 3 and 4 divergent at apices. Mid tibia with one long and one short black apical ventral spur.

Genotype, *Rioxa formosipennis* Walker.

Key to the Species.

1. Fifth wing-vein setulose along most of the extent of the anal cell; wing dark brown, with yellow markings, the most conspicuous being a V-shaped mark that has its apex on third vein beyond level of outer cross-vein, its upper arm lying along the third vein to base, and its lower arm running obliquely back through the discal cell beyond middle of the latter, and terminating over apex of fifth vein (Pl. XI. fig. 15) *exul* (Curran).
 Fifth wing-vein bare above; wing markings not as above 2.
2. Scutellum without discal hairs; wing dark brown, with subhyaline markings, the most conspicuous being an irregular streak that starts at apex of the anal vein and runs forward through the apical portion of the discal cell to the middle of the outer cross-vein, and divides in the second posterior cell (Pl. XI. fig. 16) ... *formosa*, sp. n.
 Scutellum with many short stiff dark discal hairs; wing dark chocolate-brown, with about ten small yellowish hyaline marks, those in cells transverse streaks, the marginal marks spot-like *formosipennis* (Walker).

Neothemara exul (Curran). (Pl. XI. fig. 15.)

Proc. Cal. Acad. Sci. vol. xxii. no. 1, p. 27 (*Themarohystrix*) (1936).

I identify as this species several specimens that agree with the description, but differ from the figure of the wing in having the first posterior cell with two hyaline marks in the apical third instead of one angulated streak (Pl. XI. fig. 15). The face has a central subquadrate dark brown mark, the centre of frons has a dark brown vitta. Mesonotum with six black vittæ, the lateral and central pairs usually complete, the latter usually connected with the sublateral postsutural pair at the hind margin by a black transverse streak. Pleura with two partial black vittæ.

Originally described from a female taken on Mouo Island. Guadalcanal: Popanu, 500 feet, 12. xii. 1934, no. 3792, Kovagombi, 1. v. 1936, no. 5790 (*R. A. Lever*); Solomon Islands no other data, July-Aug., 1909 (*W. W. Froggatt*).

The yellow mark on the wing is frequently broken in the middle of the discal cell, and the central pair of mesonotal vittæ is sometimes not connected with the posterior marginal black streak.

Neothemara formosa, sp. n. (Pl. XI. fig. 16.)

Female.—Head yellow, frons with a dark brown central vitta, occiput with a pair of small black marks above neck, face unspotted. Frons about one-third of the head-width and 1·5 times as long as wide, parallel-sided, with the usual bristles, the anterior half of each orbit with a series of quite long black hairs in line with the bristles, the hairs on centre not as long. Third antennal segment about 1·5 times as long as wide, rounded at apex; longest hairs on arista longer than width of third antennal segment. Epistome slightly tumid on each side.

Thorax yellow, with the same type of dorsal and pleural black markings as *exul*, but the lateral vittæ are split at posterior notopleural calli, the central pair are attenuated at suture, much widened behind it, and not connected with the posterior marginal black streak, which is much wider than in *exul*, and the sublateral vittæ fall much short of the suture. Scutellum with a larger dark basal mark, apparently bare.

Legs as in *exul*, but the apical two segments of fore tarsi black.

Wing (Pl. XI. fig. 16) with a greater proportion dark brown than in *exul*, the yellow markings less extensive. Fifth vein bare.

Abdomen glossy black, bases and apices of most tergites narrowly yellow; sheath of ovipositor black, black haired.

Length 7 mm.

Type, San Cristobal: Kirakira, 9. v. 1935 (*R. A. Lever*).

I have seen specimens of the genotype, *Rioxa formosissima* Walker, from New Guinea, but so far as I know it does not occur in the Solomon Islands.

SOPHIRA Walker.

Proc. Linn. Soc. Lond. vol. i. p. 34 (1857).

Sophira quadripunctata, sp. n. (Pl. XI. fig. 17.)

Female.—A bright orange-yellow species, with concolourous hairs and bristles, the wings distinctly yellow basally, the stigma entirely orange-yellow, costa from beyond apex of first vein to apex of fourth with a narrow

dark edging, the fifth vein with a similar suffusion along the length of the discal cell, and a paler dark mark above the free part of the anal vein; abdomen with a large oblong black mark on each side of the fifth tergite and a smaller one on each side of sixth.

Head missing from type-specimen.

Thorax unicolorous orange-yellow, shiny, all the hairs and bristles concolorous. Bristles as follows:—1 humeral, 2 notopleurals, 1 presutural, 1 supra-alar, 2 postalars; 1 pair of dorsocentrals well behind the transverse line of the supra-alars, 1 pair of acrostichals, 1 mesopleural, 1 weak pteropleural, and 6 scutellars, the intermediate pair a little shorter than the other two pairs. Mesonotum slightly flattened behind; scutellum flattened and bare on disc, subtriangular.

Legs moderately stout, fore femur with some irregular posteroventral bristles, mid tibia with a long apical ventral spur, hind tibia with the anterodorsal series of setulæ quite strong.

Wing (Pl. XI. fig. 17) quite deeply orange-yellow tinged on basal half, subcostal and first veins orange-yellow, the others dark brown, stigma entirely orange-yellow, costa with a narrow fuscous border from a little before apex of the second vein to apex of fourth, darker apically, a fuscous cloud along the fifth vein on discal cell and a fainter dark cloud above the anal vein in third posterior cell. Stigma longer than the costal cell, the first vein ending in costa distinctly beyond level of inner cross-vein, third costal section shorter than fourth, subequal to stigma; inner cross-vein about one-third from apex of the discal cell; outer cross-vein about as long as the penultimate section of fourth vein. First vein setulose from about middle of node to apex above bare below; third vein setulose from base to near apex above, and with a few rather widely spaced setulæ from base to about midway to inner cross-vein below. Halteres orange-yellow.

Abdomen elongate ovate, shiny orange-yellow, fifth tergite with a large deep black mark along each side on the entire extent, fifth with similar but smaller spots. Sixth tergite distinctly shorter than fifth; sheath of ovipositor flattened, with the apex tapered. All hairs and bristles orange-yellow, the hairs strong and lying close against the surface.

Length, with head allowed for, but ovipositor omitted, 8 mm.

Type, Guadalcanal: Lunga, 29.iii.1934, no. 1364 (*R. A. Lever*).

This species is very similar in most respects to *S. flava* (Edwards) from New Guinea, but the latter has the apex of the stigma fuscous, the dark apical mark on the costa more pronounced, the inner cross-vein at about two-fifths from the base of the discal cell, and only one smaller pair of round deep black spots on abdomen, on the fifth tergite.

RABAULIA, gen. nov.

Generic characters.—Arista long haired; frons fully twice as long as wide, slightly widened in front, vertex produced backward in the form of a carina, rounded in outline when seen from above; frontal bristles as follows: two pairs of forwardly and inwardly sloped infraorbitals, the upper one well in front of the longer and stronger of the two pairs of reclinate supraorbitals, the latter a little above middle of frons and much longer than the upper pair, ocellars short and fine, directed slightly upward and almost directly outward; inner pair of verticals long and strong, the outer pair about half as long, and longer than a pair of almost parallel bristles on the margin of the carina near its outer edges; face convex, highest a little below middle in profile, from that point roundly receding to lower edge, the latter not produced; antennæ extending to point of recession of face; eye higher than long, slightly oblique, more pointed above than below; gena about one-sixth as high as eye; proboscis short and stout; palpi spatulate. Thorax with the following bristles: 1 humeral, 2 notopleurals, 1 supra-alar and a short bristle behind it, 2 postalars, 1 intra-alar and a short bristle close to it, 1 pair of acrostichals, 1 pair of dorsocentrals well behind the transverse supra-alar line, 6 scutellars, the intermediate pair the shortest, no discal hairs, 2 mesopleurals, and 1 sternopleural, the pteropleural lacking. Scutellum flattened, disc bare. Inner cross-vein at middle of the discal cell of wing and below apex of first vein; first, third, and fifth veins setulose above, node of first not setulose, fifth

setulose on both sections. Mid tibia with two long and two very short apical ventral spurs.

Genotype, the following new species.

Rabaulia fascifacies, sp. n. (Pl. XI. fig. 18.)

Male and Female.—Head bright orange-yellow, face with a deep black fascia across centre, a small dark brown mark between each antenna and eye, upper frontal orbit narrowly black against eye, upper occiput more or less browned. All hairs and bristles black. Third antennal segment about three times as long as wide, rounded at apex; longest hairs on arista about as long as third antennal segment. Genal bristle moderately long.

Thorax glossy black, mesonotum almost without dust, with three narrow orange-yellow vittæ on disc, usually fading out or obliterated posteriorly, a complete pale lemon-yellow vitta from humeri inclusive to base of halteres, widening behind, on the upper edge of pleura, and the sutures of pleural sclerites yellowish. All bristles and hairs black.

Legs orange-yellow, mid and hind coxæ and fore and hind femora more or less extensively blackened. Fore femora with some strong posteroventral bristles; mid femora with two series of short black bristles on most of the anterior surface; hind femora with a few closely placed short anteroventral bristles on apical third or less; hind tibia with one or two fine anteroventral bristles near middle, and a series of short anterodorsal setulæ on the basal two-thirds.

Wings entirely black-brown (Pl. XI. fig. 18). Squamæ yellowish white. Halteres yellow.

Abdomen black, glossy, more or less extensively orange-yellow on apical lateral margins of the second and third tergites. Fifth tergite of male about as long as third and fourth combined, with some quite strong black bristles on lateral and apical edges; sixth tergite of female almost as long as fifth, both these tergites with some moderately strong apical black bristles. Genital tube of female conical.

Length 4–5 mm.

Type, male, *allotype* and a number of *paratypes*, Guadalcanal Is., Lunga, 4. vi. 1935. *Paratypes*, Russel Is., July 1933; S. Mala, Sapaina, 20. v. 1934 (*R. A. Lever*); Rabaul (*F. H. Taylor*).

The last specimen in the collection of Health Department, Sydney, N.S.W. 18 paratypes and type and allotype in the collection of the British Museum (Natural History), one male paratype retained by the writer.

CLUSIOSOMA Malloch.

Proc. Linn. Soc. N.S.W. vol. li. p. 547 (1926).

This genus belongs to a group containing several quite similar appearing genera, amongst them *Rabaulia*, *Themarohystrix* Hendel, and *Trypanocentra* Hendel. There are several species of the genus, but only the genotype, *semifusca* Malloch, has been described.

Clusiosoma pleuralis, sp. n. (Pl. XI. fig 19.)

Male and Female.—A shiny yellow species, with black marks on thorax and abdomen, and the wings hyaline at base, brown on costa from near base to apex, broadly so at apex.

Head yellow, the occiput broadly glossy black, only the lower portions of sides yellow, ocellar spot fuscous, and sometimes a central brown vitta on the frons, the second antennal segment is almost entirely black, the third yellow. Frons at vertex not over one-fourth of the head-width, almost parallel-sided, and over twice as long as wide, vertex and upper orbits shiny, the former slightly raised, but not carinate, remainder of frons dull; two pairs of incurved and slightly forwardly directed infra-orbitals, and two pairs of reclinate supraorbitals, the anterior pair of latter at middle of frons and more than twice as long as the weak posterior pair; ocellars hair-like, much shorter than the postvertical pair, the latter, upper supraorbital, and outer vertical pairs subequal in length; surface hairs fine and dark, one hair between the posterior pair of infraorbital and anterior supra-orbital pairs rather long; postocular cilia black, setulose. Antennæ inserted a little below middle of eye in profile, pendulous, the third segment about twice as long as wide, narrowly rounded at apex, extending to near lower third of face, the latter depressed above, slightly convex below level of apex of third antennal segment and from the highest point receding to the unprojecting epistome; gena about half as high as width of third antennal segment; eye higher than long, slightly oblique, the anterior

facets slightly enlarged, and lower half of posterior outline slightly emarginate.

Thorax glossy yellow, mesonotum more orange-yellow, with a broad black central vitta on entire extent and over the scutellum that is more or less widely divided presuturally by a line of the ground-colour, the vitta widened to cover all the anterior intrahumeral area and with a narrow streak along edge next to humeri that is more or less distinctly carried backward, sometimes to base of wings; pleura with two black vittæ, the upper one extending from propleura to base of haltere and about one-third as wide as the mesopleura, the lower one extending from propleura to the sternopleural bristle and as wide as the upper one; metanotum broadly black in centre. All hairs and bristles black. Bristling complete, the sternopleural alone lacking, there is a small bristle behind the supra-alar, the dorsocentral pair is in line with the supra-alars, and the intermediate pair of scutellars is very short.

Legs yellow. Fore femur in male about twice as thick as middle pair, with a group of biseriate bristles on the posteroventral surface beyond middle, the posterior series much longer than the anterior, the longest three or four longer than the greatest diameter of femur, the anteroventral surface with minute black setulæ; fore tibia in same sex with a spongy apical expansion on posterior side at apex, the apical surface of which is densely pale pilose, and the posterior edge furnished with a few short black hairs; fore tarsi normal; fore femur of female not much thicker than the mid pair, with three or four moderately long black posteroventral bristles; fore tibia and fore tarsi normal; mid tibia with one long, one much shorter, and a few very short black apical ventral spurs; hind tibia with one median anteroventral bristle and a series of black anterodorsal setulæ.

Wing (Pl. XI. fig. 19) hyaline, with dark brown cloud from middle of the costal cell to wing tip that widens as it progresses forward, running rather irregularly obliquely across field from base of third vein to apex of fifth, suffusing apical third of discal cell, the stigma black-brown. First vein setulose from node to apex above and with a few setulæ below at apex, third vein

setulose from base to near apex above, less extensively and more sparsely setulose below, fourth vein setulose above and below centrally, fifth vein setulose above on part of its extent on both the posterior basal and discal cells, bare below. Inner cross-vein at about two-fifths from apex of discal cell; anal cell with a short straight-sided lobe. Halteres yellow.

Abdomen largely blackened, with black hairs and bristles, genital cone black.

Length 3-4.5 mm.

Type, allotype, and 1 *paratype*, Guadalcanal: Kukum, 8. xi. 1935, no. 5177. *Paratypes*, Tulagi, 1 specimen, 5. xii. 1934, *Hibiscus*, no. 3821; Guadalcanal: 3 specimens, Lunga, 4. vi. 1935, no. 4581; 2 specimens, Russell Is., July 1933 (*R. A. Lever*).

The specimens from Russell Island have the mesonotal vittæ more widely separated by the yellow streak in centre and the short postsutural lateral vittæ are separated.

XARNUTA Walker.

Proc. Linn. Soc. Lond. vol. i. p. 28 (1857).

I describe below a new species of this genus that differs from the two already known to me in having the wing much paler, yellowish brown, with some dark brown markings, instead of dark brown with a few hyaline marks.

Xarnuta confusa, sp. n. (Pl. XI. fig. 20.)

Female.—Head pale brown, the face yellowish brown, the only black mark being the interocellar one. Frons about one-fourth of the head-width and a little over twice as long as wide, parallel-sided, upper orbits shiny, remainder dull, orbits slightly yellow dusted. Three strong pairs of incurved and slightly proclinate infra-orbitals, and two pairs of supraorbitals, the lower one of the latter at upper fourth of frons and stronger though not much longer than the upper one; ocellars minute; inner verticals the strongest and longest bristles on head, about twice as long as the outer pair, a pair of bristles in transverse line with the latter and directly behind the inner pair that are almost as long as the erect pair of postverticals. Postocular cilia closely placed, dark, and

pointed. Surface hairs on frons short, erect, and dark. Antennæ inserted at middle of eye in profile, descending to about lower third of face, third segment three times as long as wide, not tapered to the rounded apex; arista with the longest hairs about one-third as long as the width of the third antennal segment. Face vertical, epistome barely projecting, parafacial not visible in profile centrally. Eye over 1.5 times as high as long, gena not higher than width of third antennal segment, with many microscopic dark hairs, the goral bristle strong.

Thorax yellowish brown, almost yellow along upper margin of the mesopleura, the mesonotum dark brown, shiny, scutellum a little paler, all hairs and bristles black. Bristles all present, the dorsocentral pair but little in front of the acrostichals; scutellum flattened above, subtriangular, about half as long as the mesonotum, densely covered with short stiff decumbent black hairs and with some short bristles between the longer eight on the margin.

Legs reddish yellow, quite stout, fore femur with a series of strong black posteroventral bristles, mid and hind femora with a few fine hair-like ventral bristles, apically with some closely placed setulæ on the anteroventral or posteroventral surfaces; mid tibia with four or five stout setulæ or short bristles centrally on the posterior surface, and two stout black apical spurs; hind tibia with a complete series of closely placed anterodorsal setulæ and no anteroventral bristles.

Wing (Pl. XI. fig. 20) pale yellowish brown, with some dark brown markings, the most prominent being a rather wide irregular oblique fascia from the stigma over the inner cross-vein to fifth vein, an angulated narrower fascia from the costa between first and second veins over the outer cross-vein to the hind margin, and a large apical patch, except tip of first posterior cell, which is hyaline. Stigma hardly more than half as long as costal cell, inner cross-vein close to apical third of discal cell, veins 3 and 4 divergent at apices; first vein setulose from close to base to apex above and at apex below, third vein setulose from base to near apex both above and below, the setulæ more widely spaced below; fifth vein bare; lobe of anal cell elongate. Halteres with brown knobs.

Abdomen broadly ovate, almost glossy, black, with dense decumbent stiff black hairs on all tergites, some lateral marginal bristles most conspicuous apically, and an apical transverse series on the sixth tergite, the latter as long as fifth. Sheath of ovipositor flat and broad.

Length 6.5 mm.

Type, Malaupaina, Three Sisters, 12. v. 1934 (*R. A. Lever*).

CARPOPTHORELLA Hendel.

Wien. Ent. Zeitg. vol. xxxiii. p. 80 (1914).

Ann. Mus. Nat. Hung. vol. xiii. p. 448 (1915).

This genus was originally erected for the reception of a manuscript species, *magnifica*, from Formosa, that was described in 1915 as cited above. I have before me now what appears to be a second species and describe it below. The most remarkable character of the genus is the possession of from six to ten pairs of strong inwardly directed infraorbital bristles, which occupy the greater proportion of the orbits. Both the species rather strikingly resemble the genera *Gastrozona* Bezzi and *Callistomyia* Bezzi, or at least the species of these genera known to me.

The two species of *Carpophthorella* may be distinguished as below :—

- A. Frons with six to seven pairs of infra-orbitals; wing with a subhyaline mark on the costa just beyond the apex of the first vein; mid and hind femora browned apically *magnifica* Hendel.
- AA. Frons with ten pairs of infraorbitals; wing uniformly dark on costa just beyond apex of first vein; legs entirely orange-yellow *setifrons*, sp. n.

Carpophthorella setifrons, sp. n. (Pl. XI. fig. 21.)

Female.—Head rather dull orange-yellow, with two brown marks on upper occiput and a brown dot between the ocelli; all hairs and bristles black except on lower jowls. Frons twice as long as its width at vertex, slightly narrowed in front, orbits linear, with numerous microscopic dark hairs besides the bristles, infraorbitals ten pairs, equally long and evenly incurved, supraorbitals 2 pairs, the upper one the shorter, the lower one longer than the infraorbitals, situated at upper fifth of orbits; ocellars minute; outer vertical about as long as lower supraorbital, not half as long as inner, and a little longer than the postverticals. Eye over 1.5 times as high as

long; face almost vertical, epistome slightly produced; gena about as high as width of third antennal segment, with rather dense short brown setulæ on margin anteriorly that are continued upward on the parafacials about midway to bases of antennæ; third antennal segment about three times as long as its basal width, slightly narrowed to its rounded apex; arista yellow at base, brown beyond, the longest hairs about as long as width of third antennal segment; proboscis stout and short; palpi spatulate.

Thorax shiny orange-yellow, mesonotum darkened near lateral edges, more distinctly so posteriorly and with the hind margin and postalar regions black, humeri not much paler than sides of mesonotum, scutellum pale orange-yellow, pleura with a dark mark on sternopleura, upper and posterior portion of mesopleura lemon-yellow, postnotum black on each side of the yellow central line. Hairs and bristles black or dark brown. Bristles as follows:—4 scapulars, 1 humeral, 2 notopleurals, 1 presutural, 1 supra-alar, 2 postalars, 1 pair of dorsocentrals almost in line with the supra-alars, 1 pair of acrostichals, 2 mesopleurals, 1 sternopleural, 1 pteropleural, and 4 scutellars. Entire scutellum haired.

Legs orange-yellow. Fore femora with a posteroventral series of long strong dark brown bristles, mid femur with a series of closely placed short brown bristles on apical portion of the posteroventral surface, hind femur with some similar bristles on apical half of anteroventral surface and some finer bristles at apex of posteroventral surface; mid tibia with a strong black apical ventral spur and with 3-5 yellow bristles on central part of the posterior surface, hind tibia with a series of short yellow bristles on entire anterodorsal surface, and no anteroventral bristles; tarsi normal.

Wing (Pl. XI. fig. 21). First vein setulose from a little before base of node to its apex above and at apex below; third vein setulose from base to level of outer cross-vein above and below, other veins bare. Halteres yellow.

Abdomen orange-yellow, blackened on sides of tergites and sometimes on their bases, genital cone black. Bristles on lateral edges of tergites and on apex of fifth and sixth strong and black, the surface hairs black.

Length 7 mm.

Type, Guadalcanal, 29. ix. 1931; a damaged paratype, Russell Is. (*R. A. Lever*).

CRISTOBALIA, gen. nov.

Generic characters.—This genus runs down to *Pæcilothea* Hendel in that author's 1914 key to the genera of the family. It differs as follows: Frons with only one pair of reclinate supraorbitals, and three instead of but two pairs of incurved infraorbitals, only the inner pair of verticals present, no short ventral bristles on the apical two-thirds of the mid and hind femora, costa with two short but distinct bristles at apex of the subcostal vein, second costal section not over one-third as long as second, the first vein almost rectangularly bent forward to connect with the costa, fourth vein not at all arched beyond outer cross-vein, the first posterior cell not widened at apex.

Genotype, the following new species.

Cristobalia lutea, sp. n. (Pl. XI. fig. 22.)

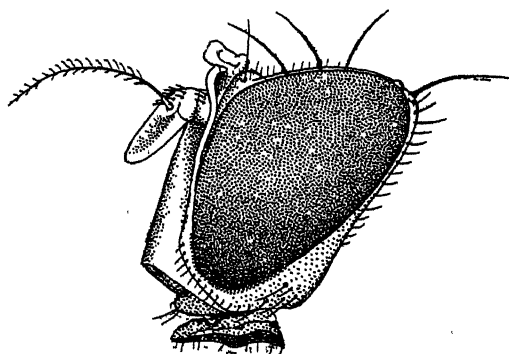
Female.—An almost entirely glossy fulvous yellow species, only the frons except the upper orbits dull, the face slightly yellowish dusted.

Head (text-fig. 4) higher than long, face almost vertical in profile, crushed in type-specimen so that it is not possible to determine its exact structure, but it is apparently slightly arched vertically, with shallow lateral foveæ. Frons less than one-third of the head width at vertex, narrowed to anterior margin, and over twice as long as wide, the three pairs of black incurved infraorbital bristles about equally spaced, the uppermost about half as far from the single stronger pair of reclinate supraorbitals that form the second pair; ocellars undeveloped; postverticals minute; inner verticals the longest cephalic bristles, the outer pair represented by short fine hairs, postocular cilia very fine, short, and dark. Antennæ inserted at middle of head in profile, third segment about 2.25 times as long as wide, tapered to the rounded apex; longest hairs on the arista about twice as long as its basal diameter. Face slightly receding below; gena not as high as width of third antennal segment, the genal bristle well developed. Proboscis stout and short; palpi normal.

Thorax entirely glossy fulvous yellow, the hairs and bristles black, upper edge of the mesopleura paler yellow. Bristles as follows:—1 humeral, 2 notopleurals, 1 presutural, 1 supra-alar, 2 postalar, 1 mesopleural, 1 pteropleural, 1 sternopleural, and 4 scutellars. Scutellum flat on disc, short, subtriangular, the bristles subequal, the surface with numerous short decumbent black hairs.

Legs yellow, normal in structure, the hairs and bristles black. Fore femur with a series of quite long rather widely separated posteroventral bristles, mid and hind pairs without ventral armature; mid tibia with one long apical ventral spur and some minute apical marginal spinules; hind tibia with the anterodorsal setulæ indistinct; mid tarsi distinctly shorter than mid-tibia.

Text-fig. 4.

*Cristobalia lutea*, sp. n. Head in profile. $\times 32$.

Wing (Pl. XI. fig. 22) yellowish hyaline, with the markings brownish yellow, the edges of the oblique fasciæ darker brown. The fasciæ on apical half similar to those of the genus *Tomoplagia* Coquillett, an American genus which has entirely different venation. First vein setulose from a little before apex of node to apex above, third vein setulose from base to beyond level of outer cross-vein above and less extensively setulose below. Inner cross-vein erect, at middle of the discal cell, outer cross-vein curved, enclosed in the largest of the wing-markings. Fourth wing vein not at all arched beyond

outer cross-vein, the apical section of third and fourth veins almost parallel. Halteres fulvous-yellow.

Abdomen glossy fulvous-yellow, ovate, depressed, the hairs and bristles black. Sixth tergite a little shorter than the fifth, with some rather strong apical black bristles, most noticeable laterally. Sheath of the ovipositor conical, black haired.

Length 3 mm., exclusive of the ovipositor.

Type, San Cristobal: Kirakira, 2. v. 1935 (*R. A. Lever*).

The genus *Pæcilothea* was included in Hendel's 1914 paper, but the genotype was not described until 1915 in a paper on the Trypetidæ of Formosa. The wing-markings of this species, *angustifrons* Hendel, are less extensive than in *lutea*, but there is also an oblique fascia in the apical half that suggests the possibility that there is a relationship between the genera, a supposition supported by the similarity in the other characters of the genotypes.

PSEUDOSPHENISCUS Hendel.

There are some seven or eight known species of this genus, from all of which the present one may be readily distinguished by the wing-markings. Only one of Bezzi's Fijian species belongs to this genus, the other not being congeneric.

Pseudospheniscus apicifasciatus, sp. n. (Pl. XI. fig. 23.)

Male and Female.—A shiny black species, with yellow head, the legs preponderantly yellow, the wings black-brown, with the hind margin whitish hyaline behind level of the anal cell up to a point near the outer cross-vein, a short spur of the white colour projecting forward to fifth vein at its end a short distance proximad of the outer cross-vein, and three whitish hyaline fasciæ, the basal one starting in the costa at apex of the first vein, running obliquely forward and downward, ending over the inner cross-vein, tapering below, the second one straight, ending a little before the outer cross-vein, the third leaving the costa over apex of the second vein, forking Y-like over third vein, its inner arm ending beyond the middle of the hind margin of the second posterior cell, its outer arm

ending above apex of fourth vein in lower apical angle of the first posterior cell. Halteres black.

Head dull testaceous yellow, the frons more brownish, interocellar spot black; face white dusted. Frons at vertex about one-third of the head width, narrowed to anterior margin and twice as long as wide, three pairs of strong forwardly and inwardly directed infraorbitals, and two pairs of reclinate supraorbitals, the anterior pair not as long as the posterior pair of infraorbitals, situated at upper fourth of the orbits, the posterior pair merely short setulose hairs; ocellars and postverticals subequal, about half as long as anterior supraorbital pair, inner verticals the longest of the cephalic bristles, at least twice as long as the outer pair; postocular cilia short, fine, and black. Eye higher than long; occiput flat; gena not higher than width of the third antennal segment, the latter fully twice as long as wide, rounded at apex, extending to a little below middle of face; arista with the longest hairs about as long as its basal diameter, most noticeably haired apically. Face vertical, epistome not protruding, foveæ shallow. Proboscis stout and short; palpi slightly widened.

Thorax black, slightly shiny, rather uniformly grey dusted, propleural region brown. Bristles and hairs black, the bristles complete, dorsocentral pair distinctly behind the supra-alar line; apical pair of scutellars distinctly shorter than the basal pair; only a few microscopic hairs on edges of scutellum, the disc bare.

Legs testaceous yellow, mid and hind coxæ and femora almost entirely black, bases of hind tibiæ browned. Fore femur with some rather short widely spaced postero-ventral bristles; mid tibia with a straight black apical ventral spur; anterodorsal setulæ on the hind tibia hardly evident.

Wing (Pl. XI. fig. 23) dark brown, with whitish hyaline markings as described above. Inner cross-vein at about one-fifth from apex of the discal cell, nearly as long as the penultimate section of fourth vein and outer cross-vein, ultimate section of the fourth vein less than half as long as the antepenultimate section and not twice as long as penultimate. First vein setulose from apex of node to apex above and at apex below, third vein setulose from base to inner cross-vein above, and more sparsely and less extensively setulose below.

Abdomen shiny black, with grey dust, the hairs and bristles black. Fifth tergite of male with some apical lateral bristles, sixth tergite of female not shorter than fifth, with some rather long apical lateral bristles; sheath of the ovipositor broadly conical, with short black hairs, some longer hairs at apex.

Length 3-3.5 mm.

Type, male, *allotype* and one *paratype*, Tulagi, 9. iii. 1935, *Premna integrifolia*, no. 3655 (*H. T. Pagden*); one *paratype*, same locality, 1933 (*R. A. Lever*).

HEMILEA Loew.

Die Europäischen Bohrfliegen, p. 32 (1862).

Ocneros Rondani, Bull. Soc. Ent. Ital. vol. iii. p. 180 (1871).

All the species of this genus known to me are distinguished from related genera by the markings of the wings, which are blackish brown on the costal half or more, the hind edge of the marking usually irregular, and the hind margin of the wing more or less broadly hyaline. The two species in the present collection differ from the genotype in having the dorsocentral bristles distinctly behind the transverse line of the supra-alar bristles.

The genotype is European. I have seen a species very closely allied to it from the Philippines, sent to me by C. F. Baker; there are two species included by Hendel in his paper on the Palearctic Trypetidæ, but one of these was removed to the new genus *Parahypenidium* by Shiraki on the basis of the much longer stigma of the wing, which is longer than the costal cell, and the higher genæ. Shiraki records four species from Formosa, and there are several others known from the Old World, one being from Fiji.

I am placing in the genus two species from the present collection, both of them differing from the genotype in having the pair of dorsocentral bristles well behind the line of the supra-alars, and the wing with the dark markings more extended backward, to beyond the fifth vein. In the Fijian species the dark brown wing mark is not carried as far back and its hind margin is straight or almost so.

Key to the Species.

- A. Mesonotum dark brown, pleuræ much paler, upper edge and scutellum bright lemon-yellow; third wing-vein rather closely and strongly setulose above to beyond the level

of the outer cross-vein; no pale mark on the costa of the wing, the discal cell dark brown, paler at apex, where there is a small oval hyaline spot close to the middle of the outer cross-vein and well above fifth vein (Pl. XI. fig. 24).....

flavoscutellata, sp. n.

- AA. Mesonotum pale brown, not much darker than the pleuræ, the upper third of the mesopleura and the scutellum ivory white; third vein with a few widely separated setulæ above to near inner cross-vein; costa of wing with a subhyaline mark just beyond the apex of the first vein, the discal cell dark brown, with a large hyaline mark in the lower apical angle that is rounded on its inner margin (Pl. XI. fig. 25).....

araliæ, sp. n.

Hemilea flavoscutellata, sp. n. (Pl. XI. fig. 24.)

Male and Female.—Head orange-yellow, centre of frons darker, orbits shiny above, ocellar spot black. Frons a little less than one-third of the head-width, and about twice as long as wide, parallel-sided, with three pairs of incurved and slightly forwardly directed infraorbitals, the anterior pair the shortest, and two pairs of reclinate supraorbitals, the anterior pair about upper third and nearly twice as long as the posterior pair; ocellar bristles short and fine, not as long as the postvertical pair; the four verticals strong, the inner pair longer than the outer; centre of frons with some fine short dark hairs. Antennæ inserted close to middle of eye in profile, nearly attaining the slightly protruded epistome, third segment about twice as long as wide, rounded at apex; arista with distinct pubescence. Eye nearly twice as high as wide, slightly narrowed above and below; gena about half as high as width of third antennal segment, genal bristle distinct. All bristles and the hairs except those on lower part of back of head black. Proboscis short and stout, palpi orange-yellow, with some short black setulæ.

Thorax brown, the mesonotum darker than the pleuræ, the upper margin of the latter and the entire scutellum lemon-yellow, bristles and hairs black. Bristles normal, scapulars weak and short, dorsocentrals nearer to the acrostichals than to the supra-alars, lower mesopleural shorter and weaker than the upper; scutellum flat, subtriangular, with four strong bristles, without hairs, but the surface microscopically pubescent.

Legs orange-yellow, the bristles dark brown, apical ventral spur and some minute apical setulæ on the tarsal

segments black, most of the hairs orange-yellow. Fore femora with well-developed posteroventral bristles.

Wing as fig. 27 (Pl. XI.), pale parts subhyaline, the dark parts chocolate-brown. Stigma about half as long as the costal cell, inner cross-vein at less than the length of the outer cross-vein from apex of the discal cell; first vein setulose from basad of apex of the node to tip above, bare below; third vein setulose from base to slightly beyond level of outer cross-vein above, closely so basally, and at base below. Costal spine undeveloped. Halteres yellow.

Abdomen glossy brownish black, the base of the basal segment sometimes orange-yellow, the hairs and bristles black. Sixth tergite of the female slightly shorter than fifth, with quite strong apical bristles; fifth tergite of male broadly rounded at apex and distinctly longer than fourth, with apical bristles.

Length 5-6 mm.

Type, female, Malaita: Su'u, jungle, 16. viii. 1934 (*H. T. Pagden*); *allotype* and two male *paratypes*, Guadalcanal: Rere, 10. viii. 1934, no. 2002 (*R. A. Lever*); one female *paratype*, Tulagi, November 1934, no. 3423 (*R. A. Lever*).

The two male *paratypes* lack the acrostichal bristles.

Hemilea aralix, sp. n. (Pl. XI. fig. 25.)

Male and Female.—Very similar to the preceding species, differing in addition to the details noted in the foregoing key, in being smaller and more slender, with the entire composite basal segment of the abdomen in both sexes bright orange-yellow, contrasting sharply with the glossy black remainder of the abdomen.

The scutellum is comparatively shorter, and the abdomen in the male has the apex of the fifth tergite almost transverse. In other respects similar to *flavoscutellata*.

Length 4-5 mm.

Type, female, *allotype*, and two male *paratypes*, New Britain, Rabaul, 22. i. 1936, no. D 232, leaf miner of *Aralia* sp. (*J. L. Froggatt*).

Mounted with one of the *paratypes* are two empty puparia. These are ivory white, and dull, of the usual stout, rounded, barrel-shape, rounded at the extremities, with quite deep segmental constrictions, the posterior

spiracles being situated on a common stout prominence, the spiracular slits elongate oval, and extending fan-wise laterally from a central rather deep puncture-like pit. The upper portion of the puparium in both is missing, so that it is impossible to state what the structure of the anterior spiracles may be.

TEPHRELLA Bezzi.

Mem. Ind. Mus. vol. iii. p. 151 (1913).

I accept as belonging to this genus a species that agrees with all essential characters of the genotype, and describe it herewith as new.

Tephrella sexincisa, sp. n. (Pl. XI. fig. 26.)

Male.—Head, including antennæ and palpi, orange-yellow, upper occiput largely blackened, face, frontal orbits, and ocellar triangle, white dusted. Orbital bristles, except the upper supraorbital pair, and the inner verticals dark brown, upper orbital paler, the post-verticals, outer verticals, and the postocular cilia yellowish white, the latter rather stout and blunt at tips, ocellars brown; frontal hairs white. Frons one-third of the head-width at vertex, narrowed in front, with two pairs of incurved infraorbitals and two pairs of supraorbital bristles, the anterior supraorbital a little above middle of frons; ocellar pair long and strong, proclinate, in transverse line with the anterior ocellus; inner verticals the longest of the cephalic bristles. Eye higher than long, anterior central facets enlarged. Antennæ inserted a little below middle of eye in profile, extending almost to the very slightly protruded epistome, third segment not twice as long as wide, slightly emarginate on outer edge, the upper apex not definitely angulate; arista slender, bare. Gena about half as high as width of third antennal segment. Proboscis short and stout; palpi spatulate.

Thorax greasy in type-specimen, but showing brownish yellow on entire pleura and widely along lateral margins of the mesonotum and narrowly on sides of the scutellum, the disc of both mesonotum and scutellum blackened, apparently greyish dusted; bristles brownish yellow, paler on pleura; hairs yellowish white. All the normal bristles present but only two scutellars that are situated

near middle on sides, the dorsocentral pair a little proximad of the transverse supra-alar line, sternopleural stronger than the pteropleural; scutellum haired on disc.

Legs entirely orange-yellow. Fore femur with a series of moderately strong brown posteroventral bristles, mid tibia with a dark brown apical ventral spur, hind tibiæ without evident anterodorsal setulæ.

Wing as fig. 26 (Pl. XI.), the pale markings milky, the dark parts almost black. This species is distinguished from its congeners by the three pairs of pale marginal marks, two being on the costal margin just beyond the apex of the first vein, two in the second posterior cell, and two in the third posterior cell; the three small round spots on the field and three subquadrate marks in the costal cell are also distinctive. Setulæ on first vein above extending from base of the node to tip, and below confined to apical third or less, those on third vein present only at base above and a few widely separated on underside from base to or beyond inner cross-vein; two costal bristles at apex of the subcostal vein; inner cross-vein at about its own length from apex of the discal cell. Halteres brownish yellow.

Abdomen short ovate, glossy black, with little trace of pale dusting, some red showing at extreme base on sides, the hairs and bristles black. Fifth tergite longer than fourth, narrowly rounded at apex.

Length 3 mm.

Type, Russell Is., July 1933 (*R. A. Lever*).

SPHENISCOMYIA Bezzi.

Op. cit. p. 146.

This genus is very similar to *Tephrella*, differing in having the cephalic bristles and postocular cilia black, the latter finely pointed, and four scutellar bristles. There is a rather evident triangular production of the lower apical corner of the anal cell that is not at all definite in *Tephrella*.

Spheniscomyia sexmaculata (Macquart).

Dipt. exot. vol. ii. p. 222 (*Urophora*) (1843).

There is some doubt as to the distinctness of the species from *atilia* (Walker), and the suggested distribution would

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indicate that the latter, which is mainly distinguished from typical *sexmaculata* by the entirely yellow hind tibiæ, should be the one to occur in this region. Both the one before me and one from Papua sent to me from the British Museum have the hind tibiæ with more than the basal halves blackened.

Admiralty Is., Manus, 25. vii. 1932, no. D 132 (*J. L. Froggatt*).

ANOMOIA Walker.

Ent. Mag. vol. iii. p. 80 (1835).

Phagocarpus Rondani, Bull. Soc. Ent. Ital. vol. iii. p. 171 (1871).

I am reversing the practice of authors in accepting Walker's name for this genus. I am convinced that Walker's paper appeared in April or early May, 1835, while the part of Chevrolat's Catalogue that contained his similar name did not appear until 1837.

The distinguishing characters of this genus have been rather variably cited by different authors, and several species have been included in it that, in my opinion, do not properly belong to it. Munro in 1935 discussed the characters given for its distinction from *Neanomœa* Hendel*.

I believe that one character found in the genotype if utilized for the segregation of the genus from its closest relatives will satisfactorily settle the problem of reliable differentiation. This is the marked downward dip of the fourth wing-vein immediately proximad of the inner cross-vein. Bezzi remarked on this character when he described a Fijian species that he erroneously placed in *Pseudospheniscus*. In the genotype, *permundus* Harris, this character is quite noticeable. As there are none of the species with the fourth vein straight before the inner cross-vein in the present collection, I do not undertake to give an opinion as to their generic allocation.

In addition to the genotype there are three other species apparently of this genus, these are:—*Pseudospheniscus curvinervis* Bezzi from Fiji, the new species described below, and another new species that I have from New Guinea which will be described elsewhere. I present a key to the first three species below.

* Arb. physiol. u. angew. Ent. Berl.-Dahl. Bd. 2, no. 3/4, p. 253.

Key to the Species.

1. The narrow black fascia across the wing at outer cross-vein much curved; the black basal mark on wing enclosing two hyaline marks in the third posterior cell, the outer one large, separated from the hyaline apex of the cell by a black line; the small hyaline mark in the costal cell higher than long; thorax largely, legs and halteres entirely yellow. (Palearctic, Formosa.)..... *permunda* Harris.
 The narrow black fascia across the wing at outer cross-vein straight to or almost to the costa; only one hyaline mark enclosed by the black in the third posterior cell, this consisting of a streak from base to apex above the anal vein; the hyaline mark in the costal cell quadrate or much longer than high; thorax black; legs largely black; halteres with fuscous or black knobs 2.
2. The hyaline mark in the costal cell of wing much longer than high, not attaining the costal vein, the latter black above the mark; inner cross-vein at about twice its own length from outer (Fiji) *curvinervis* (Bezzi).
 The hyaline mark in the costal cell of wing quadrate, extending to costa, the costal vein yellow above the mark; inner cross-vein at not more than its own length from outer *quadrata*, sp. n.

Anomoia quadrata, sp. n. (Pl. XI. fig. 27.)

Male and Female.—Head orange-yellow, frons a little more brownish, interocellar spot fuscous. Frons at vertex a little less than one-third of the head width, narrowed to anterior margin, and fully twice as long as its width at vertex; three pairs of infraorbital and two pairs of supraorbital bristles, the anterior pair of latter much stronger than the posterior pair and situated at about the upper third of frons; all four verticals strong, the ocellar and postvertical pairs about as long as the posterior supraorbitals; postocular cilia black, setulose. Third antennal segment about 2.5 times as long as wide, rounded at apex, reaching almost to the epistome; arista subnude. Parafacial not visible centrally in profile; gena about as high as width of third antennal segment; eye nearly twice as high as long.

Thorax glossy black, with faint brownish grey dusting, most evident on the posterior portion of mesonotum and the disc of the scutellum when the thorax is viewed from the side and above; hairs and bristles black.

Scapular bristles weak and hair-like ; all the other bristles present and strong, the lower mesopleural shorter than the upper and the apical pair of scutellars very little shorter than the basal pair. Propleural hairs rather long and setulose ; dorsocentral bristles well behind the transverse line of the supra-alar pair ; scutellum with a few black microscopic hairs on the lateral edges.

Legs with all the coxæ and femora and basal halves or more of the hind tibiæ blackened, remainder bright fulvous or orange-yellow, the hairs and bristles black. Fore femur with a series of rather strong posteroventral bristles ; mid tibia with a strong straight black apical ventral spur ; hind tibia with an almost complete antero-dorsal series of fine, short, black setulose hairs.

Wing whitish hyaline, with black markings (Pl. XI. fig. 27), the veins brown. First vein setulose from just before apex of node to apex above, bare below, third vein setulose from base to inner cross-vein above, and with one or two setulose hairs at extreme base below ; other veins bare. Second vein flexed forward in the narrow black preapical fascia, and from there running much closer to costal vein to its junction with the latter about as far before apex of third vein as is the fourth vein behind third ; wing tip more pointed than in the genotype. Inner cross-vein at about its own length from outer, and sub-equal in length to the cross-vein closing the base of discal cell ; outer cross-vein not as markedly oblique as in the genotype ; lobe of anal cell narrow, fully as long as inner cross-vein. Halteres fuscous to black.

Abdomen glossy black, with uniform brownish-grey dust on the first four tergites except the apex of fourth beyond the transverse series of preapical bristles. The bristles on fourth and fifth tergites forming a quite well-developed transverse series a short distance from the extreme apex. Genital cone of female black, piercer fulvous yellow.

Length 4-5 mm.

Type, male, Tulagi, 9. iii. 1934, on flowers of *Premna obtusifolia*, no. 1044 (*H. T. Pagden*). *Allotype*, Fatura, Isabel, 1932 (*R. A. Lever*).

The allotype is partly covered with some filamentous growth, but is otherwise in good condition.

PLATENSINA Enderlein.

Zool. Jahrb. vol. xxxi. p. 453 (1911).

This genus contains about a dozen species and ranges from Formosa and India to northern Australia.

Platensina malaita Curran.

Proc. Cal. Acad. Sci. vol. xxii. no. 1, p. 29 (1936).

As is usual in this genus, there is considerable variation in the number of small hyaline dots on the wings, especially on the disc, but the two large marks on the costa just beyond the apex of the first vein and the other spots shown in Curran's figure that are on the edge of the wing are quite constant, though the pair first mentioned and the other pair in the edge of the third posterior cell may be connected with the minute dot at their apices in one or both wings of certain specimens. There is a brown mark between each antenna and eye in this species that is not mentioned by the describer, and the apical pair of bristles on the scutellum are much smaller than the basal pair in all three males before me.

Originally described from a female from Malaita I. I have before me three males, one from Malaita, and the other two from Russell Is. (*R. A. Lever*).

EXPLANATION OF THE PLATES.

PLATE X.

- Fig. 1. *Dacus frauenfeldi* Schin. Wing. $\times 6$.
Fig. 2. *Dacus unifasciatus*, sp. n. Wing. $\times 6$.
Fig. 3. *Dacus peculiaris*, sp. n. Wing. $\times 6$.
Fig. 4. *Dacus solomonensis*, sp. n. Wing. $\times 3$.
Fig. 5. *Dacus obliquus*, sp. n. Wing. $\times 6$.
Fig. 6. *Dacus varipes*, sp. n. Wing. $\times 6$.
Fig. 7. *Dacus froggathi* Bezzi. Wing. $\times 6$.
Fig. 8. *Dacus pepisatæ* Frogg. Wing. $\times 3$.
Fig. 9. *Dacus pagdenti*, sp. n. Wing. $\times 6$.
Fig. 10. *Adrama centralis*, sp. n. Wing. $\times 3$.
Fig. 11. *Adrama rufithorax*, sp. n. Wing. $\times 6$.
Fig. 12. *Adrama fuscoapicata*, sp. n. Wing. $\times 3$.
Fig. 13. *Xanthotrypeta bimaculata*, sp. n. Wing. $\times 6$.

PLATE XI.

- Fig. 14. *Euphranta scutellata*, sp. n. Wing. $\times 6$.
Fig. 15. *Neothemara exul* (Curr.). Wing. $\times 6$.
Fig. 16. *Neothemara formosa*, sp. n. Wing. $\times 6$.

- Fig. 17. *Sophira quadripunctata*, sp. n. Wing. $\times 6$.
 Fig. 18. *Rabaulia fascifacies*, sp. n. Wing. $\times 6$.
 Fig. 19. *Clusiosoma pleuralis*, sp. n. Wing. $\times 12$.
 Fig. 20. *Xarnuta confusa*, sp. n. Wing. $\times 6$.
 Fig. 21. *Carpophthorella setifrons*, sp. n. Wing. $\times 6$.
 Fig. 22. *Cristobalia lutea*, sp. n. Wing. $\times 6$.
 Fig. 23. *Pseudospheniscus apicifasciatus* Mall. Wing. $\times 12$. (The markings on the axillary lobe are due to dirt on the wing.)
 Fig. 24. *Hemilea flavoscutellata*, sp. n. Wing. $\times 6$.
 Fig. 25. *Hemilea araliæ*, sp. n. Wing. $\times 6$.
 Fig. 26. *Tephrella sexincisa*, sp. n. Wing. $\times 12$.
 Fig. 27. *Anomoia quadrata*, sp. n. Wing. $\times 12$.

XVII.—*Melita hergensis*, sp. n. (Crustacea, Amphipoda).

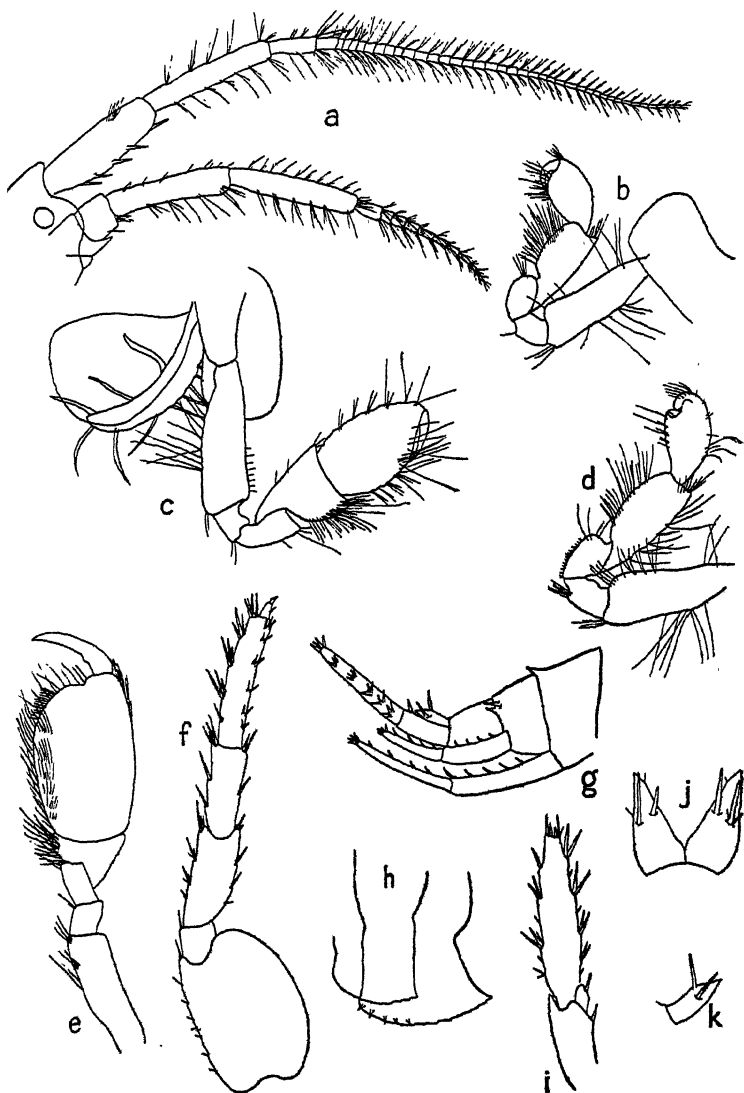
By D. M. REID, Department of Biology, Harrow School.

THIS animal occurred in a collection of specimens of *M. palmata* (Montagu) made at Wembury Bay, Devon, by members of Harrow School. The very fact of the association and general resemblance of *M. palmata* and *M. hergensis* may account for the existing confusion of the two species. Their differences, however, are quite clear, as the following table shows:—

<i>M. palmata</i> .	<i>M. hergensis</i> .
(1) Lateral head-lobes notched.	Without notch.
(2) Peduncle of 1st antenna sub-equal to that of 2nd.	1st shorter than 2nd.
(3) Bristles on antennæ short.	Bristles long.
(4) 2nd gnathopod distally wide (male).	Not distally wide.
(5) 3rd epimeral plate with small posterior tooth.	Swept back into a long point.
(6) Distal end of telson spined.	Without spines.

General Description.

Female.—Length 9 mm. Anterior head-lobes without notch. 1st urosome segment with one median tooth, 2nd segment with two lateral teeth each accompanied by a spine. The mouth-parts are normal for the genus. Ventral surface of 1st joint of 1st antenna with five fairly strong spines; 3rd joint less than half as long as 2nd; flagellum with 38 articulations; accessory flagellum bi-articulate. 2nd antenna with peduncle



Melita hergensis, sp. n.

a, head; *b*, 1st gnathopod, female; *c*, 2nd gnathopod, female; *d*, 1st gnathopod, male; *e*, 2nd gnathopod, male; *f*, 7th pereopod; *g*, urosome; *h*, 2nd and 3rd epimeral plates; *i*, 3rd uropod; *j*, telson, dorsal view; *k*, telson, side view.

longer than that of 1st antenna; flagellum with 11 articulations. Both antennæ well supplied with bristles. 1st gnathopod generally similar to that of *M. palmata*. 2nd gnathopod also similar to that of *M. palmata*. Pereiopods strong and heavily spined. 6th coxal plate produced anteriorly into a long recurved lobe.

Posterior border of 1st joint of 7th pereiopod minutely crenelated or sometimes smooth. 3rd uropod with groups of heavy spines on both sides of outer branch; inner branch small, with one lateral spine on inner side. Telson without terminal spines but with two very strong spines arising from the dorsal surface of each half, and two small marginal bristles.

Male.—Length 10 mm. 1st gnathopod similar to that of *M. palmata*, but with long bristles on the anterior edge of the last two joints. 2nd gnathopod, 6th joint broadly oval, the palmar edge running obliquely into the posterior border. There is a distinct notch on the palmar surface close to the articulation of the finger.

The species is often of a very dark colour, which it does not lose in spirit.

Discussion.

Montagu's original description (1804), although not detailed, leaves one in no doubt as to what animal he was describing. He says "... hands remarkably large, flat, triangular, furnished at the upper angle with a moveable fang, capable of closing only on the middle, or palm, which is formed a little concave." His sketch shows the type of "hand" (*i. e.*, 6th joint of 2nd gnathopod of the male) figured by Sars (1890) and Chevreux and Fage (1925). The dissimilarity between the adult and juvenile forms of this gnathopod in *M. palmata*, and the similarity between the juvenile gnathopod of *M. palmata* and the adult gnathopod of *M. hergensis*, probably gave rise to the confusion in the first instance. However, the finger of the juvenile *M. palmata* is much more slender than of the latter. Although Stebbing (1906) noticed the different shapes of these adult gnathopods, he regarded them as mere variations within the species. He says, when discussing *M. palmata*, that the 2nd gnathopod is "in the male very large, 5th joint

short, cup-shaped, 6th much expanded, widest at palm which is very variable, sometimes where it meets the hind margin much projecting and rounded off (Sars), at others slightly oblique and angular, with a strong group of setæ on the adjoining surface. . .” I have examined specimens in the British Museum (Natural History) labelled by Stebbing, and find that they agree with the latter part of his description. *M. palmata* may vary in its male 2nd gnathopod to this extent, but I have not seen any which do so. All the specimens which I have seen possessing this type of gnathopod also possess the other characteristics given here for *M. hergensis*. Della Valle (1893) figures, to some extent at least, the present species when describing *M. palmata*. The single specimen in the Museum, presented by him, adds to rather than subtracts from the difficulty because, though it agrees in a general way with *M. hergensis*, it differs from it in having a great, dense brush of bristles on the whole length of the 6th joint of the 7th pereopod. This is the only specimen of its kind which I have seen. Other specimens, from Naples, do not show this characteristic. Besides the above variation, I have found a female from Wembury without a median dorsal spine on the first segment of the urosome.

Distribution.—There are specimens in my collection from Wembury Bay (on *Fucus serratus*), Devon, and from Keyhaven, Hampshire. In the collection in the British Museum (Natural History) the following localities are represented :—Guernsey ; Polperro, Cornwall ; Salcombe and Starcross, Devon (Norman Collection) ; Meadowfoot, Torquay, Devon ; Naples (Stebbing Collection).

I have to thank Mr. M. A. Hinton, F.R.S., and Dr. Harding for allowing me to use the Collections in the Museum.

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XVIII.—*Notes on Australian Mantidæ (Orthoptera)*. By H. E. HINTON, Ph.D. (Department of Entomology, British Museum of Natural History.)

WHILE incorporating the collections of *Perlamantinae* which have accumulated in various accessions for the past few years two new species were discovered. In addition to describing these, one genus is relegated to synonymy. My best thanks are due to Dr. B. P. Uvarov for his kind help in preparing this paper.

All drawings were done by myself with the aid of a camera lucida. Lines next to figures refer to a length of 0.50 mm. unless otherwise indicated.

P_{THERSIGENA} Stål.

1871. *Pthersigena* Stål, Öfv. Ak. Förh., xxviii. p. 400.

1913. *Pthersigena* Giglio-Tos, Gen. Ins. cxliv. p. 7.

1914. *Pthersigena* Giglio-Tos, Bull. ent. Ital. xlv. p. 24.

1918. *Glabromantis* Sjöstedt., Ark. Zool. (19) xi. p. 12.

1927. *Pthersigena* Giglio-Tos, Das Tierreich, l. p. 17.

1927. *Glabromantis* Giglio-Tos, Das Tierreich, l. p. 18.

The genus *Glabromantis* was erected by Sjöstedt (1918) to contain a new species, *G. nebulosa*. The only characters given by him to distinguish his new genus from *Pthersigena* were the rounder pronotum and the absence of a pronotal spine on each side at about anterior fourth. The genotype of *Pthersigena*, *P. conspersa* Stål, of which we have a male and a female from Queensland, has the pronotum relatively narrower than that of *Glabromantis*, the ratio of length/breadth being 1.18, while in *nebulosa* it is 1.16. However, a slight difference in the proportion of the pronotum can scarcely be considered to be a generic character. In *conspersa* the anterior pronotal angles at about apical fourth are acute (this acute angle is the spine of Sjöstedt) and moderately produced, whereas in *nebulosa* they are obtuse and broadly rounded. But they are also obtuse and broadly rounded in *P. centralis*, so that if a slight difference in the degree of the anterior angles of the pronotum is considered to be of generic significance, *centralis* should be placed in *Glabromantis*. The pronotum of *centralis* is relatively narrower than that of *conspersa*, the ratio of length/breadth being 1.25.

In this paper *Glabromantis* Sjöstedt. is relegated to synonymy with *Pthersigena* Stål.

Cliomantis cornuta Giglio-Tos.

(Figs. 1-4 & 8.)

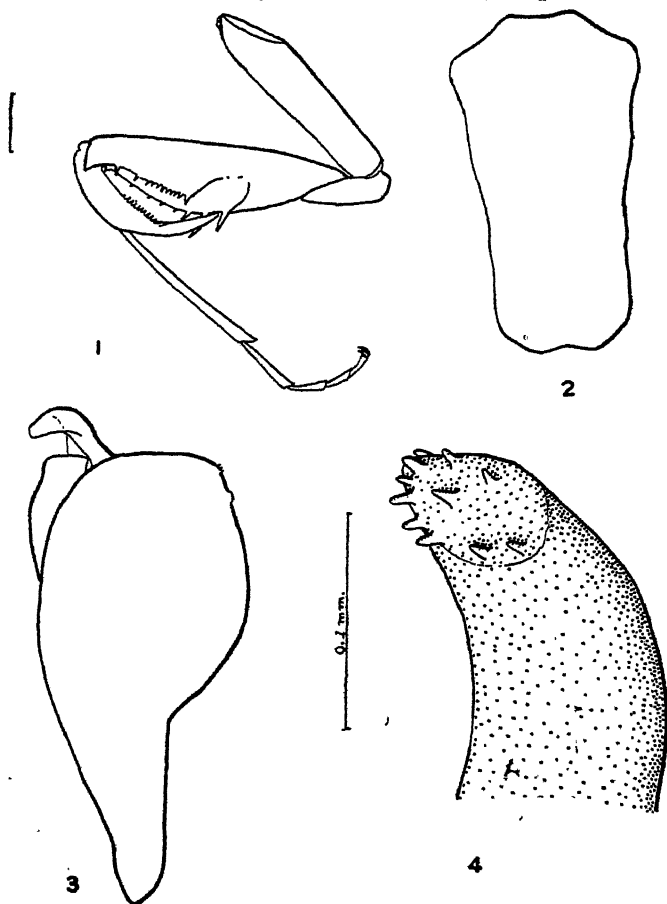
1913. *Cliomantis cornuta* Giglio-Tos, Gen. Ins. cxliv. p. 12.1914. *Cliomantis cornuta* Giglio-Tos, Bull. ent. Ital. xlv. p. 56.1918. *Cliomantis cornuta* Sjöstedt, Ark. Zool. (19), xi. p. 14.*Cliomantis cornuta* G.-Tos.

Fig. 1.—Inner face of front leg.

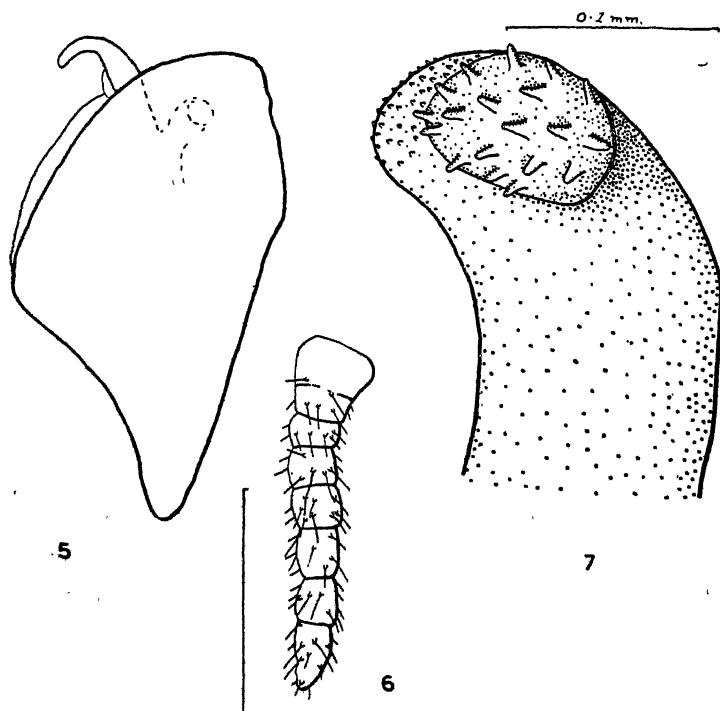
Fig. 2.—Outline of dorsal view of pronotum.

Fig. 3.—Ventral view of ventral phallomere.

Fig. 4.—Apex of right process of left phallomere.

The type-locality of this species is Queensland: Peak Downs. It has been recorded by Sjöstedt (1918) from

Western Australia: Kimberley District, and in the National Collections there is a male from Queensland: Northern Territory, Darwin. This specimen has been determined by Giglio-Tos as his species, and the opportunity is taken here of illustrating the male genitalia and other structures which will supplement the inadequate original description and figures.



Cliomantis lateralis, sp. n.

Fig. 5.—Ventral view of ventral phallomere.

Fig. 6.—Left cercus.

Fig. 7.—Apex of right process of left phallomere.

Cliomantis lateralis, sp. n.

(Figs. 5-7 & 9.)

Male.—Length (from front of head to tip of hind wing), 18 mm. Cuticle opaque and pale brown to yellow with the following darker brown and sometimes nearly black: two basal segments of antennæ, a median longitudinal

band on vertex of head, a narrow and complete median longitudinal band on pronotum, middle ventral area of pronotum, middle and hind coxæ, and dorsal and ventral parts of abdomen; fore wings hyaline and with numerous fuscous markings on the longitudinal veins; fore wing postero-lateral to stigma with a fuscous patch which is 0.56 mm. long and 0.14 mm. broad; hind wings hyaline and with numerous fuscous markings on longitudinal veins. *Head* with the greatest breadth, which is across eyes, greater than height (1.98:1.56 mm.). Eyes when seen from the side with the shape as figured (fig. 9). Ocelli large, lateral ocelli 0.21 mm. broad and with the tubercle extending above each for a distance equal to the radius of the ocellus. Antero-lateral cephalic tubercles feebly acute at apex and slightly longer (0.45 mm.) than broad. Facial shield feebly concave; at broadest point, which is across apex, nearly twice as broad as long (0.63:0.35 mm.); anterior margin moderately deeply and arcuately emarginate for its entire breadth, and posterior margin broadly rounded. Clypeus broadly and deeply depressed on middle anterior two-thirds. Labrum, particularly at middle, moderately convex; anterior margin broadly rounded and angle on each side broadly rounded. *Pronotum* at broadest point, which is across apical angles, only half as broad as long (1.34:2.62 mm.) and shaped as in *C. cornuta* (fig. 2). Surface throughout confluent and microscopically asperate; without tubercles; near apical angles with numerous punctures which are slightly coarser than facets of eyes and are contiguous to separated by once their diameters. *Wings* with the front pair shorter than the hind pair (10.5:12.0 mm.). *Legs* with the front coxæ 1.77 mm. long. Front femora 2.13 mm. long and at broadest point 0.78 mm.; outer face with a very feeble median ridge extending along most of its length. *Genitalia* as figured (figs. 5 & 7).

Female.—Unknown.

Type.—A male in the collection of the British Museum (Nat. Hist.). Australia: Queensland, Flinders R., Glendower Station, 1700 ft., 12. xi. 1923 (*G. H. Wilkins*).

Comparative notes.—The two previously described species, *C. cornuta* and *C. dispar*, have the pronotum throughout dull brown, while the new species has the

pronotum very pale brown with a conspicuous and complete median longitudinal band which is dark brown and occasionally black. From *C. cornuta* it may be further distinguished as follows: (1) the eyes, when seen from the side, are much more nearly round (cf. figs. 8 and 9); (2) the pronotum near apical angles has a number of distinct punctures which are absent in *C. cornuta*, and the surface is without tubercles, whereas in *C. cornuta* the surface has tubercles which are usually separated by two to four times their diameters; (3) the outer face of the front femora has a very feebly convex median ridge, whereas in *C. cornuta* this ridge is narrow

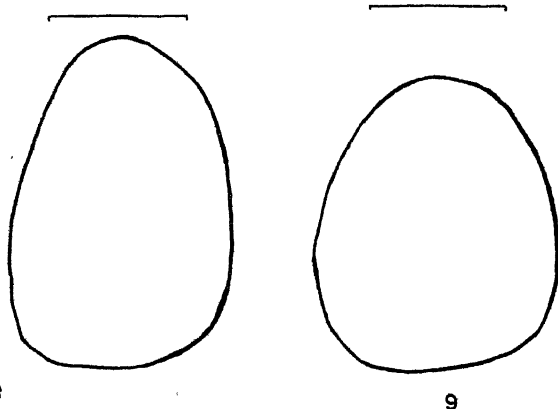


Fig. 8.—Lateral view of eye of *Oliomantis cornuta* G.-Tos.
Fig. 9.—Lateral view of eye of *C. lateralis*, sp. n.

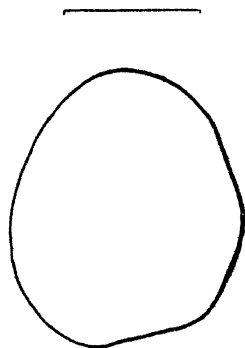
and strongly convex; and (4) the male genitalia are differently shaped (cf. figs.).

The type was labelled "*Oliomantis cornuta* G.-Tos, det. Beier."

Oliomantis obscura, sp. n. (Figs. 10–13.)

Male.—Length (from front of head to tip of hind wing), 18 mm. Cuticle opaque and mostly moderately dark brown except for the following parts, which are paler and nearly yellow; segments of antennæ beyond second, front of head, mouth-parts, and all of legs except apices of tarsi and those of femora and tibiæ of the middle and hind pairs; fore wings hyaline and with numerous

fuscous markings on the longitudinal veins and at posterior margin, also on the cross-veins; fore wing postero-lateral to stigma with a fuscous patch which is 0.21 mm. broad and 1.06 mm. long; hind wings hyaline and with numerous fuscous markings on the longitudinal veins and, at apical posterior margin, also on the cross-veins. *Head* with the greatest breadth, which is across eyes, greater than height (1.91 : 1.63 mm.). Eyes when seen from the side nearly round (fig. 10). Ocelli large, lateral ocelli 0.28 mm. broad and with the tubercle extending above each for a distance equal to a third of the diameter of the ocellus. Antero-lateral cephalic tubercles narrowed to and feebly rounded at apex and

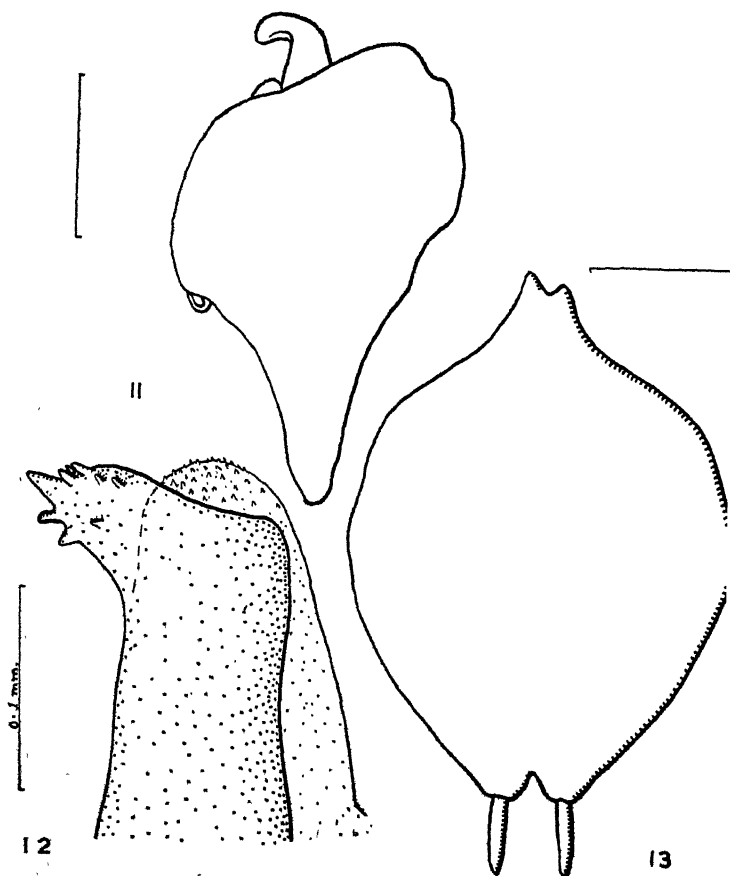


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Lateral view of eye of *C. obscura*, sp. n.

length slightly greater than breadth at base (0.42 : 0.35 mm.). Facial shield moderately feebly concave; at broadest point, which is across anterior angles, more than twice as broad as long (0.71 : 0.28 mm.); anterior margin moderately deeply and arcuately emarginate for its entire breadth and posterior margin broadly rounded. Clypeus broadly depressed on middle anterior half, but with the middle of the depression near anterior margin only about a fourth as broad. Labrum moderately strongly convex; anterior margin and anterior angles very broadly rounded. *Pronotum* at broadest point, which is across apical angles, half as broad as long

(1.23 : 2.41 mm.) and shaped as in *C. cornuta* (fig. 2), but with the sides behind apical angles and at basal third slightly but distinctly more strongly sinuate, and the middle anterior margin is nearly as strongly sinuate as



Otiomantis obscura, sp. n.

Fig. 11.—Ventral view of ventral phallomere.

Fig. 12.—Apex of right process of left phallomere.

Fig. 13.—Subanal plate from ventral view.

the basal. Surface very densely and microscopically alutaceous throughout and occasionally, particularly near sides, this microsculpture appears asperate; without tubercles and without distinct punctures. *Wings* with

the front pair shorter than the hind pair (11·5 : 13·5 mm.). *Legs* with the front coxæ 1·77 mm. long. Front femora 2·05 mm. long and across broadest point 0·60 mm.; outer face with a feebly raised broad and convex median ridge extending along most of its length. *Genitalia* as figured (figs. 11–12).

Female.—Unknown.

Type.—A male in the collection of the British Museum (Nat. Hist.). Western Australia: Merreden, 13. xii. 1935 (*R. E. Turner*).

Comparative Notes.—This species appears to be most closely related to *C. cornuta* G.-Tos, from which it may be distinguished as follows: (1) the eyes are nearly round, while in *C. cornuta* they are much higher than broad (*cf.* figs. 8 and 10); (2) the surface of the pronotum is without tubercles, whereas in *C. cornuta* the surface is here moderately densely and very finely tuberculate; (3) the outer face of the front femora has a broad and feebly convex median ridge, whereas in *C. cornuta* this ridge is narrow and strongly convex; and (4) the male genitalia of the two species are very differently shaped (*cf.* figures).

XIX.—*Contribution to the Study of the Palpicornia*.—
Part III. By J. BALFOUR-BROWNE, M.A., F.Z.S.,
F.R.E.S.

Cælostoma leonensis, sp. n.

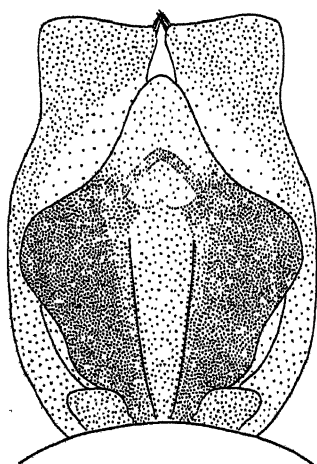
d'Orchymont, in his revision of *Cælostoma* (s. str.) (1936 *a*), provisionally included a single female from Rhobomp, Sierra Leone, in *C. subsphæroides* Rég. Later (1937) he created a new species for specimens from the Cameroons, *C. zumpti*, and suggested the possibility of the Sierra Leone female belonging actually to the latter species.

During a rearrangement of the British Museum *Cælostoma* in the light of d'Orchymont's revision of the genus two males from Sierra Leone were found. The single Rhobomp female is also in the British Museum collections and agrees in all respects with the two males, and I have

no hesitation in asserting that it belongs to the present species and not to *C. zumpti* as suggested by d'Orchymont. I have accordingly designated it as allotype. The two males come extremely close to *C. subsphæroides* in size and form, but are immediately recognisable as distinct by the presence on the elytra in the interstices of the punctation of a microscopical reticulation, as described for the female, which is clearly discernible under a high magnification.

The ædeagus has very little resemblance to the form seen in *C. zumpti* d'Orch., but is similar to that of

Fig. 1.



Caelostoma leonensis, sp. n. Ædeagus, dorsal view, $\times 40$.
Preterminal ventral orifice seen by transparency.

C. subsphæroides Rég. The central lobe is distinctly shorter and broader than in that species, and the aliform lateral expansions are much more largely rounded.

The distribution of some of the African species of this genus appears to be extraordinarily restricted, whereas other species have a very much wider distribution.

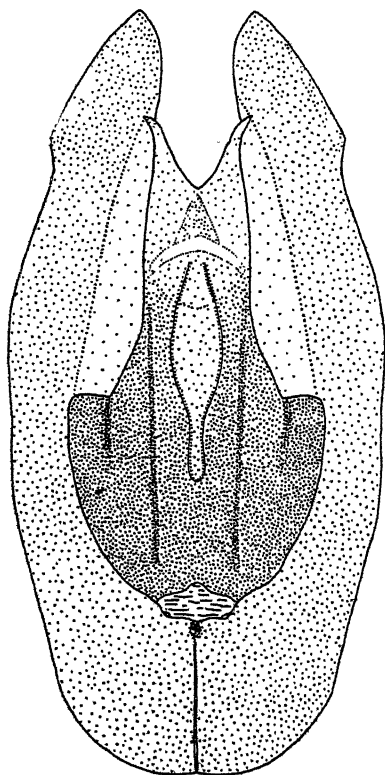
Holotype: SIERRA LEONE, Songo, 13. ix. 1924 (*E. Hargreaves* leg.), (*Caelostoma subsphæroides* Rég. Knisch det. 1925), ♂, size 5.60×4.09 mm. Allotype: SIERRA LEONE, Rhobomp, ♀, size 6.11×3.82 mm. (pronotum extended).

Paratype: SIERRA LEONE, Juru, 21. viii. 1912 (*Jas. J. Simpson* leg.), ♂, size 6.18 × 4.0 mm. (head extended).

Cælostoma anthracinum, sp. n.

This new species is very similar to *C. mocquerysi* d'Orch. in form and sculpture, but is very much larger. It is

Fig. 2.



Cælostoma anthracinum, sp. n. Aedeagus, dorsal view, × 40.
Ventral orifice seen by transparency.

possible that the large specimens from Gaboon and Inner Loanga mentioned by Régimbart under *C. punctulatum* (1903) may belong to this species and not, as

d'Orchymont (1936 *a*) supposed, to *C. mocquerysi*, but the geographical separation of localities is considerable and I would hesitate to ascribe them without examination of males.

The very distinct form of the ædeagus of this species, which is quite unlike that of any described form, encourages me to describe the species as new, although only a pair of specimens is available.

Holotype: SENEGAMBIA, Kazamanza River (*R. Casamanca*) (*Bocandé* leg.), in Sharp collection, ♂, size 7.27 × 3.81 mm. (the breadth is of the base of the pronotum; the specimen had been mounted on a pin and the right elytron is broken at the base and a part is missing). Allotype: same particulars, ♀, size 7.27 × 4.31 mm.

Cœlostoma (s. str.) *rutarum* d'Orchymont (1936 *a*).

Cyclonotum orbiculare Wollaston (1867) (nec Fabricius). Cape Verde Islands.

d'Orchymont (*l. c.* 1936 *a*) expressed doubt as to the correctness of Wollaston's identification of the Cape Verde species under the discussion on *C. hispanicum* (Kust.). I have dissected males in Wollaston's original series and in specimens collected by L. Fea and found the ædeagus to agree in all respects with that of *C. rutarum* d'Orch. This is one of the species of extended distribution, since I have also seen specimens from Angola, North-West Rhodesia, Belgian Congo, Nigeria, Gold Coast, Annobon Island (Gulf of Guinea).

Paracymus phalacroides (Wollaston) (1867). (*Hydrobius*.)

Paracymus punctillatus Rey (1884 (1885)).

I have examined the series of four specimens in Wollaston's Cape Verde Islands collection and am able to state that the *Hydrobius phalacroides* is not, as stated in Knisch (1924 *a*), an *Anacæna*, but is really a *Paracymus* as is proved by the glabrous metafemora and the mesofemora pubescent for just over half their length. By the eight-segmented antennæ, the more or less longitudinally carinate prosternum, the absence of a longitudinal carina on the first abdominal sternum, the pubescence of the mesofemora reaching beyond the middle of the segment, and the dorsal punctation fine, the species runs down to *P. punctillatus* Rey in d'Orchymont's key (1926 *a*).

of the genus. I have compared the Cape Verde specimens with undoubted *punctillatus* and am unable to detect any substantial difference to warrant their separation as distinct species or even as subspecies. Accordingly Wollaston's name, having seventeen years' priority, will be the valid name of the species.

Helochares (Sindolus) atratus Bruch. (1915).

d'Orchymont (1926 *b*) gives both this name and *H. ventricosus* Bruch as synonyms of *H. gibbus* (Brullé) described as an *Hydrophilus*. The name is, however, preoccupied by *Hydrophilus gibbus* Illiger (1801) (= *Amphiops*) and accordingly the valid name of this species will be *atratus* Bruch, which has page priority over *ventricosus* Bruch.

Helochares (s. str.) *pallens* (MacLeay) (1825).

Helochares lewisius Sharp (1873).

In addition to the two names given in synonymy by d'Orchymont (1926 *b*), *H. lewisius* Sharp described from Japan is to be added, following dissections of ex-typis from Sharp's collection. Certain specimens of the ex-typis display a rather stronger and more sharply impressed punctuation than is seen generally in this species.

Helochares (Hydrobaticus) championi Sharp (1882).

Examination of this species has shown it to belong to the subgenus *Hydrobaticus* by the possession of ten longitudinal series of punctures on the elytra which are not mentioned by Sharp. These longitudinal series are very weakly impressed and composed of punctures scarcely larger than the interstitial punctuation. By the form of the ædeagus, simply trilobate, the species is scarcely to be distinguished from *H. (H.) maculicollis* Mulsant, although they would not easily be confused on the external characters.

Helochares (Hydrobaticus) rufobrunneus, sp. n.

H. abbreviato (Fabricius) sat similis sed paulo minor, oculis minus convexis, elytris tenuiter sed distincte et sparse, præcipue versus suturam, punctulatis, margine posteriore submenti distincte marginato; apice lobi centrali ædeagi vix furcato.

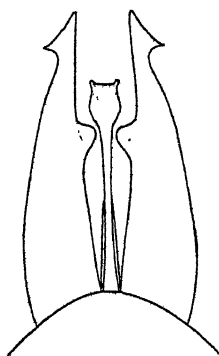
Holotype: WEST INDIES, Grenada, Balthazar (Windward side) (*H. H. Smith* leg.), ♂, size 7.10 × 3.50 mm.

Paratypes: 1 ♂, 2 ♀♀, same particulars; 1 ♂, WEST INDIES, St. Vincent (South end) (*H. H. Smith* leg.).

This species is very similar to *H. abbreviatus* (Fab.) (= *pallidus* (Cast.)) in colour, but may immediately be recognised by the presence of a fine punctation on the elytra between the linear series. This punctation becomes much more widely spaced towards the external margins and apex, but is clearly visible on a close examination.

The sides of the clypeus in front of the eyes are a little less rounded than in the compared species; the lateral margin of the pronotum is, on the contrary, more rounded, making the anterior and posterior angles appear more widely rounded. The curved transverse rugosities of the

Fig. 3.



Helochaeres (Hydrobaticus) rufobrunneus, sp. n.
Aedeagus, dorsal view, $\times 40$.

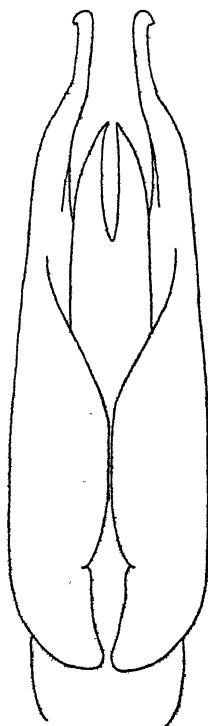
centre of the mentum are rather stronger and more evident than those in *abbreviatus*, but the submentum in the two species is almost exactly the same.

The form of the aedeagus in the two species is quite distinct, the apex of the central lobe in *rufobrunneus* being hardly at all emarginated, the ventral aliform expansions are barely developed and the lateral ones are very small, whereas in *abbreviatus* the apex of the central lobe is deeply forked and the ventral and lateral aliform expansions are more strongly developed. The species appears to be somewhat related to *H. guadelupensis* d'Orchymont according to the description.

Helochares (s. str.) *inornatus* d'Orchymont (1926 b).

A single immature male has been received from British Guiana, Upper Kutari River, 10-12. xii. 1935 (*G. A. Hudson* leg.), which appears to belong to this species described from four females. The size of this specimen is 9.09×4.63 mm. and the colour is a uniform reddish brown. The *ædeagus*, although very weakly chitinised,

Fig. 4.



Helochares (s. str.) *inornatus* d'Orchymont.
Ædeagus, dorsal view, $\times 40$.

is recognisable as to form. The entire dorsal surface is covered with an extremely fine ultra-microscopic reticulation as was hazarded for this sex by d'Orchymont.

There are also in the collection one male and two females from Brazil, Rio Sappó, Rio Solimoes, "from water in

canoe," 21. xi. 1874, *Dr. Trail* leg. (ex Sharp collection), which must be ascribed to this species. The ædeagus is identical with that of the male already mentioned. The size of these specimens is:—♂, 10.0×5.56 mm., ♀, 10.0×5.71 mm., ♀, 9.7×5.54 mm. They are all old and much scratched specimens. The colour is black, the anterior part of the head and the margins of the pronotum and elytra vaguely reddish. The male is somewhat shining and the ultra-microscopic reticulation has almost disappeared; one of the females much resembles the male, being somewhat shining and the reticulation only slightly less effaced. The second female is much duller, the reticulation being more evident, appearing almost as a fine granulation of the surface.

The mentum is not emarginated on the anterior edge, but there is a deep excavation and the gibbosity behind each anterior angle is evident. The specimens are otherwise in agreement with the minute description given by d'Orchymont. As the male has not hitherto been recognised, I have prepared a figure of the ædeagus which has some resemblance to the same organ of *H. pallipes* Brullé.

Oocylus nudus, sp. n.

Rotundato-ovale, sat latus, sat convexus, nitidus, supra nigro-æneus; capite subtransverso, irregulariter, sparse tenuiterque punctato, antennis 8-articulatis, palpis sat robustis; pronoto transverso, antice bisinuato, ut in capite punctulato; scutello triangulato, ut latitudine ut longe; elytris ut in capite punctulato, versus latera punctis majoribus, haud pubescentibus; subtus, prosterno in medio tenuiter carinato, antice dentato, haud spinoso, procoxis spinis tenuissimis perpaucis; mesosterno processu elevata aream rhomboidalem, antice ventraliter prolongato, in medio vix turgidam, formante, spinis brevibus tenuissimis perpaucis, munito; femoribus intermediis nitidis, spinis brevibus paucis minutis, femoribus posterioribus glabris, punctis spiniferis perpaucis, spinis brevissimis; segmentibus ventralibus abdominis nitidis sat crebre setosis; antennis, palpis pedibusque rufescentibus.

Holotype: CHINA (*Bowring* leg.), 22. iii. 1851, ♂, size 3.91×2.46 mm. Allotype, same particulars, ♀, 12. i. 1851, size 4.0×2.49 mm. (*Bowring* is known to have collected in South China, Hong Kong, and Amoy

about these dates and these specimens are therefore probably from this locality.)

This interesting species is larger and decidedly more convex than *O. latus* d'Orch., the only other Old World species known to me, and the punctation is also much stronger. The elytra show six very irregular linear series of larger punctures, which are more evidently linear towards the margins. The species is easily distinguished from all the described species by the absence of a pair of spines at the anterior end of the prosternal carina and by the extremely fine spines of the mesosternal process. Sharp, in his descriptions, as pointed out by d'Orchymont (1919), specifically mentions that the procoxae of *O. maculatus* Sharp are "destitute of spines," but examination of the type and a second specimen identified by Sharp as "*O. maculatus* var." (from Volcan di Chiriqui, 25-4000 ft., *Champion*) proves this observation to be erroneous, since a few fine, but distinct, spines may be discerned among the hydrofugal pubescence when the specimens are viewed in profile. The new species is similar to *O. maculatus* in this respect, the procoxal spines being very difficult to see among the hydrofugal pubescence. The spines of the mesosternal process are also extremely difficult to distinguish, being very fine and short. The tibiae are strongly spinose. The apical sternum is rather copiously and closely punctured, laterally margined, the apex being almost truncate and unmargined, but with short stiff setae.

The aedeagus is simply trilobate, the parameres rather broad at the base and tapering gradually to the apex which is rounded. Internally, just before the apex they appear to be emarginate. The centre lobe is as long as the parameres, of even width throughout, and the apex simply rounded. The ventral gonopore is situate some distance before the apex.

Oocylus fryanus, sp. n.

Elongato-ovalis, subparallelus, minus convexus, niger, nitidus; capite subtransverso, regulariter sat distincte punctato, antennis 8-articulatis, palpis brevibus, robustis, mento plano, antice sat ruguloso punctato, postice fere impunctato, tenuiter reticulato; pronoto antice bisinuato, irregulariter sat distincte punctato, aliis grandibus, aliis minoribus,

lateribus, angulis posticis exceptis, angustule flavis; elytris ut in capite punctatis, seriebus irregularibus circiter quinque punctorum majorum, versus latera vage sulcatis, macula pervaga viride-ænea ad discum paulo ante medium, maculis duabus rotundatis flavis, unum paulo post medium inter series punctorum 3am 4amque, alteram antepicali inter series punctorum 2am 3amque. Subtus, prosterno leviter carinato, antice fortiter dentato, quadrispinoso, coxis anticis fortiter spinosis, tarsis anticis articulo ultimo articulis quattuor basalibus simul sumptis fere æquale; mesosterno processu elevato lineari spinis fortis munito, femoribus intermediis posterioribusque nitidis, punctis spiniferis irregularibus. Segmentibus ventralibus abdominis sat crebre setosis, versus latera et segmento ultimo totaliter perminute reticulatis, segmentibus 2, 3, 4que utrinque flavo-maculatis.

Holotype: BRAZIL: Rio de Janeiro (Fry Collection), ♂, no. 42677 (*Hume*), size 6.28×3.36 mm. Allotype, same particulars, ♀, size 6.52×3.43 mm. Paratypes, same particulars, 2 ♀♀, sizes 6.27×3.36 mm. and 6.54×3.55 mm.

This new species is very clearly distinct from all previously described, except *O. decorus* (Kuwert), by the flavous margin of the pronotum. It is distinguished from that species by the larger size, quadrispinose tooth of the prosternum, more linear mesosternal process, and the presence of only one extremely vaguely defined greenish æneous spot on the elytra and two small round flavous spots. The bright-coloured patches are apparently localised areas of very finely reticulated surface which breaks up the light rays falling on them. The same structure can be discerned in *decorus* (Kuw.) and *maculatus* Sharp.

Chætarthria seminulum (Herbst) (1797).

Chætarthria similis Wollaston (1864) (*syn. nov.*).

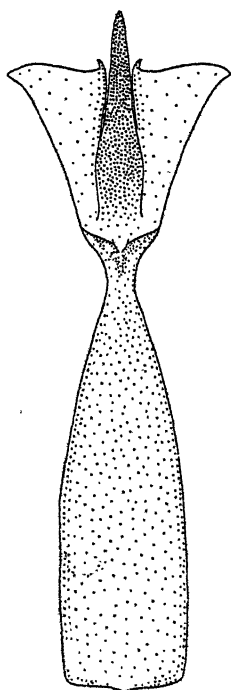
This new synonymy is based on dissection of authentic material of Wollaston's species. Whilst agreeing with Wollaston's statement that the elytral punctures are much more distinct than in British material, I have specimens from Spain and Gibraltar in G. C. Champion's collection which are nearly as sharply punctured as the Canary Islands material. The increasing degree of impression of the punctures seems to be correlated with

a more southern habitat, since specimens from North Germany have the elytral punctuation nearly effaced, except at the sides.

Chætarthria bicolor Sharp (1882).

Whilst my note on the following new species was still in manuscript with a figure of the ædeagus of Sharp's

Fig. 5.

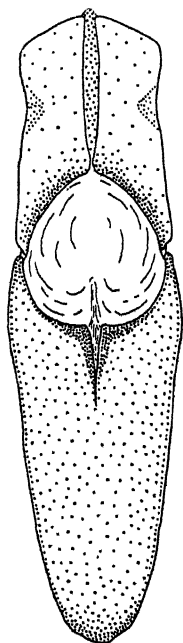


Chætarthria bicolor Sharp. Ædeagus of the holotype, dorsal view, $\times 75$.

type-male of *C. bicolor*, I received a reprint of d'Orchymont's paper (1939 *a*) on the genus with his interpretation of Sharp's species, in which he suggests that the type is perhaps a female, in view of its greater size than the specimens he assigns to the species. Comparison with my figure indicates that the two forms are not identical,

although extremely closely related. I think the relationship is best expressed by classifying the specimens named by d'Orchymont as a subspecies for which I propose the name *mexicana*.

Fig. 6.



Chætarthria bruchi, sp. n. Aedeagus, dorsal view, $\times 70$.

Chætarthria bruchi, sp. n.

Ovalis, sat late, sat convexus, nitidus, brunneo-testaceus; capite nigro, nitido, punctis tenuis sparsis munito, pronoto transverso, punctis tenuis perpaucis munito, angulis anticis obtuso-rotundatis; posticis subrectis; elytris irregulariter sat crebre tenuiterque punctulatis, stria suturali ab apice usque ad tertiam partem anteriorem attingente distincta; subtus flavo-piceus, antennis, palpis pedibusque flavo-testaceis; mas tibiis anticis versus basin intus pseudo-emarginatis.

Holotype: ARGENTINE, Tucuman, 12. x. 1929 (*H. E. Box* leg.), ♂, size 2.36×1.36 mm. Allotype, ♀, same particulars, size 2.54×1.31 mm. (head extended).

This new species bears a label "*C. bicolor* Sharp det. Bruch." I have compared it with the type and only specimen of Sharp's species, which is a male. There proves to be no relationship at all between the two species, but the relationship is much closer to *C. panthea* d'Orchymont (1939*a*), to which the species runs in d'Orchymont's key. Sharp's species is smaller (the type measures by micrometer 2.18×1.18 mm.) and a little more flavous-coloured. The basal lobe of the ædeagus is evidently much longer than in *C. panthea*, being nearly twice as long as the apical lobe, and the apex of the parameres is more decidedly truncate. There is also a considerably effaced reticulation visible on the head and pronotum between the punctures.

Amphiops lasioides Régimbart (1903).

Amphiops sphæroidalis Knisch (1924 *b*) (*syn. nov.*).

This species was described from Madagascar, Diego Suarez; Africa: Egypt and Gaboon. The type-locality is not designated, but there is no doubt that it should be Diego Suarez, since this locality is first mentioned and the paper in which the species is described deals with the fauna of South Madagascar. Dissection has proved that the Madagascar and Egyptian forms are quite distinct. I have not seen individuals from the Gaboon.

Three specimens from Portuguese East Africa: Xina-vane (*Hardenberg* leg.), identified by Knisch as *A. sphæroidalis* and bearing in addition B.M. type and co-type labels, have proved to possess a form of ædeagus identical with ex-typis of Régimbart's species and accordingly the synonymy is established. I think the B.M. labels have been affixed in error, since the type-locality and only one mentioned in the description is Zanzibar.

Amphiops phallicus d'Orchymont (1936 *b*).

Amphiops lasioides J. Balfour-Browne (1938 (1939)) (non Régimbart).

At the time of sending in the MS. of my paper (1938) I had not seen the description given by d'Orchymont, and relied, as stated, on four specimens from the Sobat River identified by d'Orchymont as *A. lasioides* Rég. for my identification of the Palestine specimens. I have

now seen a male of d'Orchymont's species from Uganda, Kampala (G. H. E. Hopkins coll.), identified by d'Orchymont as *A. phallicus*, and can state that the Egyptian and Palestine specimens belong here, as undoubtedly does the Cairo specimen mentioned by Régimbart.

Amphiops globus Erichson (1843).

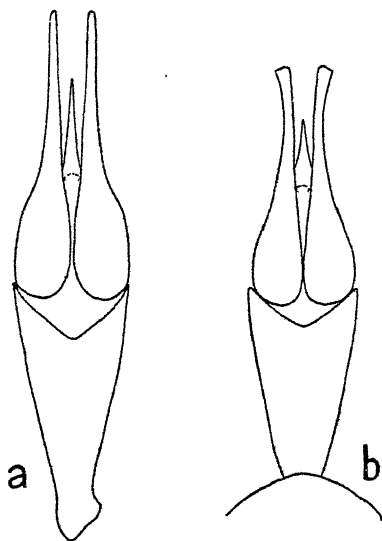
I have observed a curious feature in this species which I have not seen mentioned. Some specimens possess an apparent double punctation of the elytra between the lateral series of larger punctures and the normal systematic series, and this punctation is closely set. Other specimens have a very much sparser general punctation which is almost quite uniform in size. Although these two extremes are readily distinguishable, there is evidence of intermediate stages, and as the ædeagus of the two extreme forms is identical they are clearly only variations of one species.

Amphiops australicus Blackb. and
duplopunctatus Blackb. (1898).

The holotypes of both these insects are in the British Museum and dissection has proved them to be females. A long series of specimens from the Adelaide River, Arnhemland, agree very closely with the type of *australicus*. Males of this series have been dissected and show the basal lobe of the ædeagus to be as long as the parameres, which exceed the central lobe in length by a small amount. The extremity of the parameres is obliquely truncate, the obliquity exterior. Two male specimens which agree very closely with the type of *duplopunctatus* were found in Sharp's collection from Queensland, Brisbane, and Rockhampton. The ædeagus of these males is very similar to that of *australicus* with the parameres and basal lobe of about equal length. The central lobe is proportionally rather shorter than the parameres, however, and appears rather finer throughout its length. The apex of the parameres is simply rounded. It is difficult not to regard these two forms as being one species, in view of the close similarities of the male sex organ. Until more material of *duplopunctatus* is available, I

hesitate to disturb the existing arrangement, but I am inclined to regard this form as, at best, a subspecies of *australicus*.

Fig. 7.



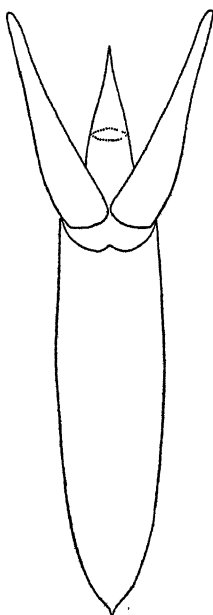
(a) *Amphiops duplopunctatus* Blackburn. Aedeagus, ventral view, $\times 40$.
(b) *A. australicus* Blackburn. Aedeagus, ventral view, $\times 40$.

Amphiops queenslandicus, sp. n.

A short series of specimens was found in Sharp's collection, apparently from some very old collection, as the specimens are much decayed. The identical method of mounting indicates that all are probably from one locality (Brisbane, Queensland), found on only one of the pins. The specimens have been cleaned, dissected, and remounted. This species comes close to *A. simplex* Sharp in the elytral punctuation and in the form of the aedeagus, but is slightly larger. The aedeagus is very distinct from the form seen in *australicus* and *duplopunctatus*, with the basal lobe long, twice as long as the parameres, which are barely longer than the central lobe. The size is also larger than in the other Australian species and the colour is reddish brown or light castaneous, against black or very dark castaneous in *australicus* and *duplopunctatus*.

Holotype: AUSTRALIA: Queensland, Brisbane (ex Sharp coll.), ♂, size 4.63×3.16 mm. Allotype, ♀, same particulars, size 4.54×3.08 mm. Paratypes, 3 ♂♂, 2 ♀♀, same particulars. Paratype, 1 ♂, Queensland, Rockingham, size 4.63×3.08 mm. (ex Sharp coll.).

Fig. 8.



Amphips queenslandicus, sp. n. Aedeagus, ventral view, $\times 40$.
The parameres have been opened to show the central lobe.

Amphips mater Sharp (1873). Japan.

Subsp. *pisiformis* Fairmaire (1884), Indo-China (*new combination*).

Subsp. *pedestris* Sharp (1890), Ceylon (*new combination*).

Subsp. *annamita* Régimbart (1903), Annam (*new combination*).

Subsp. *sumatrensis* Régimbart (1903), Sumatra (*new combination*).

Examination has revealed that the aedeagus of this complex is quite similar throughout, and accordingly all the forms must be united under the oldest name, that of the Japanese examples described by Sharp (1873). In view of the comparatively well-defined distinctions on geographical distribution, I think it more reasonable to

treat the forms as subspecies than to make them simple synonyms of one extremely variable species.

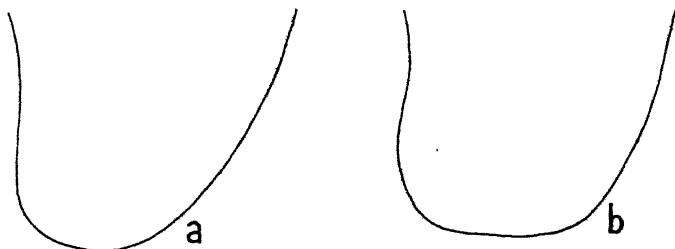
Fig. 9.



Amphiops mater Sharp. Aedeagus, ventral view, $\times 40$.

Knisch (1924 *a*) treats *A. mater* as a subspecies of *A. gibbus* (Illiger) (1801), but this appears to me erroneous.

Fig. 10.

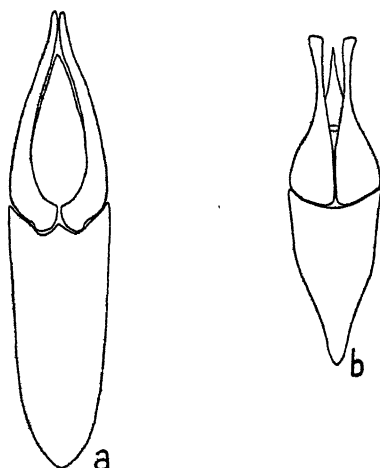


Lateral margin of the pronotum of (a) *Amphiops gibbus* (Illig.), (b) *A. mater* Sharp. The anterior margin of the pronotum is on the left of the figures.

A single female from Burma in the British Museum from Andrewes' collection bears a label "*Dem Amphiops gibbus*
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Illig. sehr ähnlich. Kolbe." This specimen has also been seen by d'Orchymont, who has added a label "Comparé au type unique de Hydr. gibbus Ill. 1801 par Kolbe." A second female is in H. G. Champion's collection from Sarda, Bengal, which is quite comparable with the specimen from Andrewes' collection. According to these specimens *A. gibbus* has the lateral margins of the pronotum relatively narrowly rounded, whereas in *A. mater* they are widely rounded or practically straight, and as a result the posterior pronotal angles are much more defined in the latter species.

Fig. 11.



Ædeagus, ventral view, $\times 40$, of: (a) *Amphips simplex* Sharp; (b) *A. mirabilis* Sharp.

Amphips mirabilis Sharp (1890). Ceylon.

variolosus Régimbart (1903), Burma, Java (*syn. nov.*).

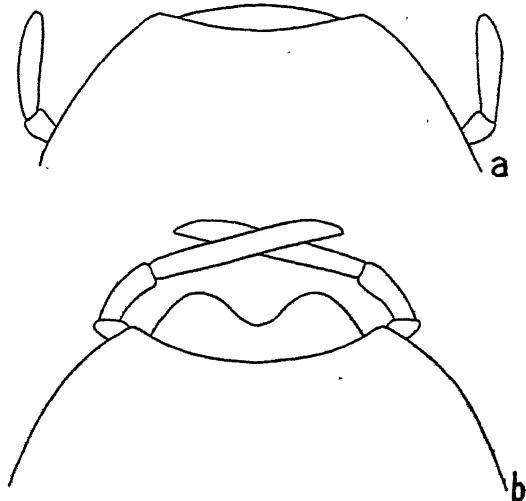
The unique type of this species is a female. A topotype with identical labels has been found in Sharp's collection. This is, fortunately, a male, and the ædeagus proves the species to be quite distinct from *A. mater* subsp. *pedestris* Sharp, with which it was compared. In this species the basal lobe is just as long as the parameres, which in turn are barely longer than the central lobe. The apex

of the parameres is slightly dilated and the extreme apex is transversely truncate.

A short series of Javanese specimens in the collection identified by d'Orchymont as *A. ? gibbus* Illig. cannot be that species, since, basing my interpretation of it on the specimens mentioned above, the lateral margins of the pronotum are much more widely rounded and the lateral serial rows of punctures on the elytra are smaller. The ædeagus of the Javanese examples agrees exactly with that of the topotype male of *mirabilis*, although the specimens are much paler than either type or topotype.

I am unable to distinguish the so-called variety *variolosus* Régimbart from the typical form of *mirabilis*, and accordingly unite the name as a simple synonym.

Fig. 12.



Male labrum and anterior margin of the clypeus, seen from above, of (a) *Globaria tibiale*, sp. n., (b) *G. punctata* (Blackburn).

Globaria punctata (Blackburn) (1888).

The holotype of this species is a female, as has been proved by dissection. I have a few other specimens from Queensland which undoubtedly belong here. They comprise 4♂♂ and 2♀♀. d'Orchymont (1939 a), in his

recent revision of the genus, makes no mention of any form of sexual dimorphism in this species, and as examination has revealed two very distinct dimorphic characters I consider it valuable to detail them.

In the male the labrum is practically concave, seen from above, with the anterior margin deeply and widely emarginated in the middle, giving an appearance somewhat reminiscent of *Ochthebius macrognathus* Lea. The female labrum is normally convex when seen from above, with the anterior margin simply rounded.

The anterior tibiae of the male have the distal extremity enlarged or inflated and three distinct faces are discernible, each delimited from its neighbours by a longitudinal row of setae. Thus, seen in the long axis from the distal extremity, the protibiae appear to be triangular. The enlarged distal extremity is black, in sharp contrast to the flavo-testaceous proximal portion. The female protibiae are simple, unenlarged, the distal extremity black. The meso- and metafemora are little flattened and have scattered setigerous punctures over most of the surface, with the exception of the basal quarter which has dense hydrofugal pubescence. There appears to be no dimorphism in the femora, as will be described below for a new species.

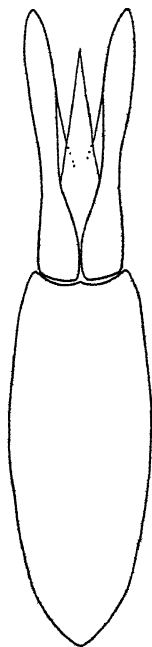
Globaria tibiale, sp. n.

This new species is very similar in certain respects to *G. punctata* (Blackburn), but is a little shorter, and broader, particularly the head, and the colour is a coppery-black, not blue-black. The male may be easily distinguished from the species compared by the simple labrum, which is normally convex above and rounded along the anterior margin, and also by the anterior tibiae being simple at the apex, antero-posteriorly flattened, not as described above in the other Australian species. The meso- and metafemora are also broader, more flattened, and less tubular, and possess a small patch of dense golden hairs just in front of the antero-internal angle of the subfemoral furrow. This patch is larger and more conspicuous on the mesofemora. The outer third of the femora also has scattered setigerous punctures, the middle third is glabrous and the inner third has dense hydrofugal pubescence. The female does not possess these patches of golden hairs, but the setigerous

punctures are more aggregated together in the position in which they occur in the male.

The abdominal sterna also serve to distinguish the species from *G. punctata*. The first segment is somewhat narrowed in the middle, strongly and rather broadly carinated; the second segment is weakly, the third barely at all, narrowed in the middle and both these segments are distinctly and rather strongly gibbous in

Fig. 13.



Globaria tibiale, sp. n. Aedeagus, ventral view, $\times 40$.

the median line; the fourth segment is simple. The ventral sutures are wide and deep.

The aedeagus is rather similar to that of *G. punctata*, but the parameres are distinctly longer, nearly as long as the basal lobe, broader, and the apex less rounded. The central lobe is finer and much more sharply pointed, but is distinctly shorter than the parameres, attaining only two-thirds of their length, whereas in *G. punctata* the central lobe is very nearly as long as the parameres.

The punctuation of the sides of the elytra is stronger and a little denser than in the compared species, and the linear series of punctures have become quite indiscernible in any of the fifteen specimens before me.

Holotype: AUSTRALIA, Arnhemland (North-Western Territory), Adelaide River, ♂, no. 4969, size 4.83×3.19 mm. (head extended) (*J. J. Walker* leg.). Allotype, ♀, same particulars, without number, size 4.24×3.26 mm. Paratypes, same particulars, 7 ♂♂, 6 ♀♀.

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XX.—*Leptonema pallidum* Guérin (*Trichoptera*).

By MARTIN E. MOSELY.

IN a revision of the genus *Leptonema*, published by the Trustees of the British Museum in 1933, I stated that it was desirable that the genotype, *pallidum*, from Brazil, should, for the time being, remain unidentified, as no available specimen of a *Leptonema* having a habitat in Brazil quite agreed with Guérin's original description.

It had been suggested that Walker's *albovirens* was a synonym of Guérin's species but, as *albovirens* is more or less confined to Central America and Mexico, and as no record from Brazil could be traced, I considered it wiser not to accept this view, having regard to the possibility of a more suitable candidate for the position turning up from Brazil itself.

Recently, the Trustees of the British Museum acquired the McLachlan collection, and in it there is a *Leptonema* from Rio Janeiro labelled *pallidum* by McLachlan which exactly conforms with Guérin's description.

On clearing and making an examination of the genitalia, I found it to be the species described by Ulmer as *furcatum*, his types being recorded from Esperito Santo and other localities in Brazil. The examples of this species before me, when I revised the genus in 1933, appeared rather too dark to be associated with Guérin's description, but McLachlan's specimen is much paler and I have little doubt that it is the true *pallidum* Guérin.

I repeat here the description and figures of the species which appeared in the 1933 revision, giving also a figure of the wings of the McLachlan specimen.

Leptonema pallidum Guérin. (Figs. 1-2.)

- Leptonema pallida* Guérin, Iconogr. Regne Anim. p. 396 (1843).
Leptonema pallida Walker, Cat. Brit. Mus. Neur. p. 78 (1852).
Macronema pallida Hagen, Neur. N. Amer. pp. 284, 328 (1861).
Leptonema pallida Hagen, Phryg. Synop. Synon. pp. 831, 845 (1864).
Macronema pallida Brauer, Reise Novara Neur. p. 9 (1866).
Leptonema pallida McLach., Trans. Ent. Soc. Lond. (3) v. p. 264 (1866).
Leptonema pallidum Banks, Trans. Am. Ent. Soc. xxvii. pp. 370-371, pl. 12, fig. 5 (1901).
Leptonema pallidum Ulm., Stett. ent. Zeit. lxvi. p. 60 (1905); Genera Insect. fasc. 60 a, p. 163 (1907); Collect. Selys, vi. (2) p. 47, figs. 40-41 (1907); Deuts. ent. Zeit. pp. 394-407 (1913).
Leptonema pallidum Mosely, Rev. Leptonema, Brit. Mus. pp. 64-65 (1933).
Leptonema furcatum Ulm., Stett. ent. Zeit. lxvi. p. 57, pl. 11, figs. 50-51 (1905); Genera Insect. fasc. 60 a, p. 163 (1907); Collect. Selys, vi. (1) p. 58 (1907); op. cit. vi. (2) pp. 48-49, figs. 43-45 (1907); Deuts. ent. Zeit. pp. 393, 407 (1913).
Leptonema furcatum Navás, Brot. Zool. xiv. fasc. 1, p. 30 (1916).
Leptonema furcatum Mosely, Rev. Leptonema, Brit. Mus. pp. 42-43, figs. 112-116 (1933).

Guérin's description of the type is as follows :—

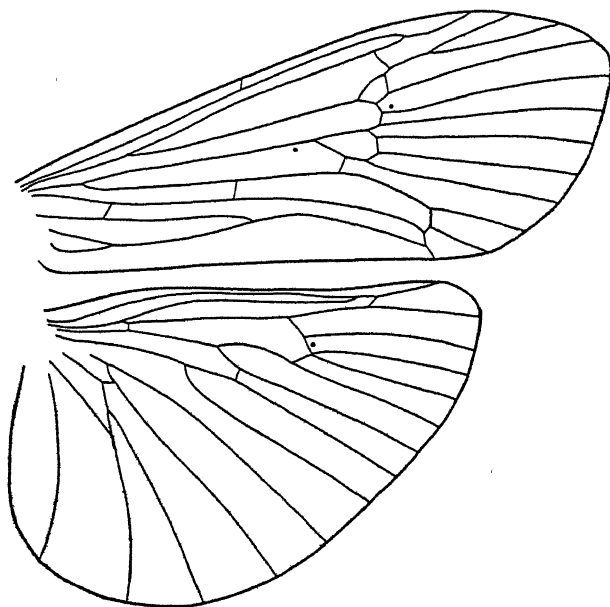
“Corps, antennes et pattes d'un jaune pâle; les antennes annelées de brunâtre. Ailes demi-transparentes,

d'un jaune pâle-grisâtre, à nervures faibles et pâles, avec une petite frange de poils un peu plus foncés au bord.—L. 12 enverg. 35 mill.—Hab. le Brésil.”

To this meagre description, I add the following :—

Genitalia, ♂.—Last dorsal segment with an upper portion terminating in an acute point ; intermediate appendages, from above, long, each with the apex rather deeply excised to form two tailwardly directed processes, the inner rather

Fig. 1.

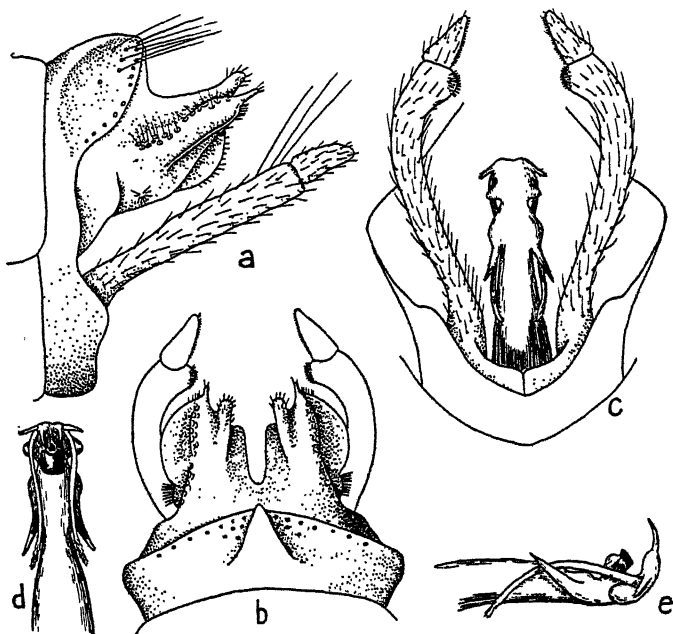


Leptonema pallidum Guérin, ♂. Wings.

large with a rounded apex, the outer small and finger-like ; there is a small wart covered with bristles towards the base on the outer margin ; from the base of the small process there is a strongly chitinized, punctate strip extending to the base of the appendage, and outside this strip the margin slopes downward in a rounded shelf ; from the side, the appendage is triangular with an acute, excised apex, the punctate strip appearing as a well-defined fold. The penis, at the apex, is divided into an

upper and a lower portion, the latter extends beyond the former and is armed with two pairs of spines, the apical pair directed upward and curving over towards the base, the basal pair directed downwards and outwards; the upper portion of the penis terminates in a chitinous plate or nodule, which is situated between two very long spines arising nearly at the apex and passing on each side

Fig. 2.



Leptonema pallidum Guérin, ♂.

a, genitalia, lateral; b, dorsal; c, ventral;
d, penis, dorsal; e, lateral.

of the upper surface of the penis towards the base, curving slightly downward and held in position by a pair of laterally placed spines directed upwards and towards the base; from beneath, the bases of the lateral spines are much broadened, and just beyond them, towards the apex of the penis, are two rounded and strongly chitinated

warts which may serve as supports on which the two, long, basally directed spines may rest. Inferior appendages two-jointed, terminal joints, which are lined with a mat of short hairs, very short, basal joint from above showing a much dilated apex; from beneath, slender and sinuate with a truncated apex, the terminal joint being set at the outer edge; there is a small clump of bristles on the inner margin just before the apex, giving the false appearance of a slight fork or projection on the inner side.

Length of the anterior wing 15 mm.

XXI.—*A new East African Didactylia* (Col., Aphodiidæ).

By RENAUD PAULIAN (Laboratoire d'Entomologie du Muséum National d'Histoire Naturelle, Paris).

Didactylia buxtoni, sp. n.

UGANDA: Sirima, 8. vii. 1934 (*D. A. Buxton*). ANGLO-EGYPTIAN SUDAN: Khor Arbat, 2. xii. 1928; Khor Gowitry, 25. xi. 1929; Wad Medani, 22. v. 1928; Tokat, x. 1926. Frequently caught at light.

Type in the British Museum; cotypes in my collection.

Straw-coloured, middle of the thorax, elytral suture, and a small preapical spot on the elytra, darker; a lighter coloured macula inside the preapical spot. Head and thorax rather shining, elytra completely opaque. The whole upper surface distinctly shagreened.

Clypeus truncate in front, not sinuate, front angles strongly rounded, margin slightly reflexed. Sides of the clypeus not sinuated between the front angles and the eyes. Puncturation fine and very sparse, interspersed with a few bigger punctures at the inner sides of the eyes.

Thorax with very long yellow setæ on the lateral margins; lateral margins of the elytra with similar setæ, the elytra covered at the apex and on the sides with a short yellow pubescence. Base margined. Sides of the thorax regularly curved to the posterior angles, which are completely rounded, greatest width of the thorax at the middle; anterior angles slightly acute; sides of the thorax with, in the anterior part, a small

transverse depression directed obliquely towards the middle. Punctuation fine and sparse, the sides of the thorax with an irregular longitudinal patch of stronger and closer punctures. No longitudinal sulcus above the scutellum.

Scutellum rather wide, unpunctured behind, with a few strong points near the base.

Elytra strongly striated, striæ distinctly punctured, interstriæ convex, very feebly and sparsely punctured.

Posterior metatarsus very slightly shorter than the two following joints taken together, longer than the upper terminal spur. Anterior tibiæ of male long and feeble, distinctly tridentate, sinuated near the base on its inner margin; truncate at right-angles at the apex. Exterior terminal teeth pointed and widely separated.

Length 3.0–3.7 mm.

Closely related to *D. turbida* Er. of the same regions, but differing in the colour-pattern; this species is also closely related to *D. clementi* Peyer., from the Hoggar Mts., of which species, thanks to M. de Peyerimhoff, I have seen the type. *D. buxtoni* differs distinctly from this last species in the structure of the head, the punctuation, etc.

I am glad to seize the opportunity offered by this description to thank Sir G. A. K. Marshall for sending me, for identification, the very interesting Aphodiid material of the Imperial Institute of Entomology.

XXII.—A *Viviparous Synaptid Holothurian from New Zealand*. By D. DILWYN JOHN, M.Sc., Department of Zoology, British Museum (Natural History).

THE British Museum (Natural History) recently received a collection of New Zealand Echinoderms from Miss L. B. Moore of University College, Auckland. It includes ten specimens of the Synaptid *Trochodota dunedinensis* (Parker) from Runnel Bay, Rangitoto, an island near Auckland, collected on September 1st, 1936. Five of these specimens contain large numbers of developing young in the body-cavity, showing that the species is viviparous. The sexes are separate (Dendy, 1897, p. 27).

Vaney, in his paper "L'incubation chez les Holothuries" (1925), summarized the knowledge of viviparity in the Holothuroidea at that time. Four viviparous Synaptids were known, and none appears to have been described since. The four species are :—

Leptosynapta minuta (Becher)—from the North Sea.

Synaptula hydriformis (Lesueur)—from the West Indian region.

Chiridota rotifera (Pourtales)—from the West Indian region.

Tæniogyrus contortus (Ludwig)—from the Southern Ocean.

In *Tæniogyrus contortus* the eggs undergo their development in the genital tubes of the mother; in the other species they develop in the body-cavity, as they are found to do in *Trochodota dunedinensis*.

Material.—The five specimens bearing young are all fairly contracted; their lengths vary from 14–19 mm., whereas fully expanded specimens may be 40 mm. long. The contraction is uneven: some parts of the body are strongly contracted while others are expanded. Though young occur throughout the length of the body, they are more numerous in the less contracted portions. The young in one mother are all at about the same stage of development. Three stages are represented in the five mothers. It is convenient to describe the youngest stage first, the oldest second, and the intermediate stage (of which the young are poorly preserved) last.

Description of Young Stages.

1. Two of the specimens contained young embryos 0.4 to 0.5 mm. long. In one there were only 27, scattered at intervals throughout the body length. The other contained 75 embryos closely packed against one another; at the anterior end they occurred all around the calcareous ring; in the middle portion of the body they appeared to be confined to the left side; at the posterior end some occurred on the right as well as on the left side.

Those embryos which are not distorted by having been tightly packed together are barrel- or box-like in shape.

The posterior end is rounded ; the anterior is truncated and produced into a rim around a wide shallow depression. Forming part of the rim, or protruding slightly beyond it, are the beginnings of the five primary tentacles, clearly marked off into a set of three (dorsal) and a set of two (ventral) ; the former usually reach farther forward than the latter. The embryos are encircled by five bands of cilia ; on the dorsal side three are close together near the posterior end, while the other two are in the anterior half ; all five come nearer together on the ventral side.

The only calcareous bodies are tiny plates, at most 0.01 mm. in diameter, the rudiments of the ossicles of the calcareous ring. They are arranged, at irregular distances from one another, in an oblique ring at the anterior end. In some embryos I have counted ten, in others only six to nine.

2. Another two specimens contained young of a much older stage, the oldest stage represented in this material. One contained 44, the other 57. They are 1.25 to 1.6 mm. long. They occurred in all parts of the body-cavity, but were most numerous at the anterior end. Their shape is that of miniature adults except for the tentacles, of which there are only five, each with a pair of short digits at the end. The three dorsal tentacles extend farther forward than the ventral pair. In a number of the young there are rudiments of accessory tentacles ; in some there are only two, one in the left ventral, the other in the right ventral, radius ; in others there are, in addition, still smaller rudiments in the two dorsal radii ; in none did I see one in the mid-ventral radius. This appears to show in what order the accessory tentacles develop, and that the first to develop are the same as in *Chiridota rotifera* (Ludwig, 1881, pp. 51-52, fig. 4) and *Tæniogyrus contortus* (Ludwig, 1898, p. 78, fig. 39). The intestine is straight and begins as a narrow tube. About one-third of the way from the anterior end it suddenly swells out, and afterwards gradually narrows again. There is a single mid-ventral polian vesicle and a short up-turned stone canal in the mid-dorsal line, which ends blindly in the body-cavity.

The calcareous ring is of ten pieces of stereom of very open mesh, which are in contact with one another. It is strongly oblique as in the adult. The body-wall contains numerous wheel deposits and sigmoid bodies. The wheels are present in all the interradii, though they are much less abundant on the ventral side, particularly in the middle part of the body. Some of the wheels appear complete, but the denticulated rim of the outer edge is not fully developed in any. Many of the later developmental stages described by Dendy (1897, figs. 3-6) are present. Among the wheel deposits I have seen one with seven spokes and two with eight, one of which was irregularly developed. The sigmoid bodies are less well developed than the wheels and few are complete; Mortensen (1925, fig. 61) has figured the developmental stages. The tentacles contain many developing, and a few complete rods.

3. The young contained in the fifth specimen are smaller than those described above. They number 58 and are about 1 mm. long. They were closely packed together and are badly preserved, so that I have not been able to see any details of their anatomy in whole mounts. There are five short tentacles with the rudiments of two digits at the ends. The pieces of the calcareous ring are in contact with one another. The deposits in the body-wall are far less well developed than in the older stage described above. The smallest are tiny rounded pieces with the circumference produced into six low points; these are rudiments of wheels. The largest are six-spoked figures in which the ends of the spokes have not begun to send out lateral processes to form the rim. There are no deposits which appear to be rudiments of sigmoid bodies.

Remarks.—This is the first viviparous holothurian to be described from New Zealand. It appears to be a common littoral form and it is to be hoped that some zoologist living there will work out its development. The only one of the four previously-known viviparous Synaptids of which the full development is known is *Synaptula hydriformis*. It was worked out by Clark (1898). None of its stages possesses ciliated bands,

such as are found in the youngest stage of *Trochodota dunedinensis* described here, and in the "pupa" stage of those Synaptids which shed their eggs into the sea.

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Principles of Genetics. By E. W. SMOTT and L. C. DUNN. Third Edition. Pp. xiv+408; frontispiece, 147 text-figures and 32 tables. London: McGraw-Hill Publishing Co., 1939. Price 21s. net.

SOME biologists, whose work has not taken them into this field, still seem to regard genetics as if it were mainly the specialized study of that useful laboratory animal, the vinegar fly, *Drosophila melanogaster*. In fact, a wide range of species has, in the last forty years, been drawn within the ambit of genetic research, and the authors of the work under review have been wise in selecting their examples from many different plants and animals.

No genetic text-book of any value is likely to fall into the category of light reading, but the authors are to be congratulated on providing a most lucid statement both of facts and current ideas. Advance has been so rapid since 1925 (when the first edition appeared), and even since 1932, that, although the basic principles have remained unchanged, much of the original work has been recast and rewritten to make room for important new matter. The recent publication of Dobzhansky's 'Genetics and the Origin of Species' and Goldschmidt's 'Physiological Genetics' has made it possible to treat quite briefly the two active centres of advance covered by these works. Though as a text-book it is primarily designed for the use of students, the working biologist can hardly

fail to derive benefit from reading it, and will certainly find much information collected and stated in a convenient and simple form. In particular, attention may be directed to the concise, clear treatment of those elementary statistical tests and biometrical methods which are rapidly becoming an essential part of the equipment of any biologist.

There is no general bibliography, but relevant references are listed at the end of each chapter. Here also are given a series of problems, or exercises, directly relating to the content of the preceding chapter. Many of these are designed purely to familiarise the student with the methods of genetical analysis and the inferences that can be drawn from a given set of facts, but others are provocative of original thought, and undoubtedly this feature forms a valuable extension of the text.

In any work of this kind it is possible for the captious reviewer to find statements which might have been more happily expressed or with which he does not fully agree. For instance, at p. 58 it is rather more correct to say that a population which differs from an expected ratio by less than twice its standard error "is not incompatible with the hypothesis tested" rather than that it "is therefore probably an instance of the ratio in question." It may just as probably, or perhaps even more probably, be an instance of a slightly different but unexpected ratio. The point may seem a small one, but it is essential that the non-mathematical student using statistical tools should have a precise idea of what he is doing.

Again, the authors still use the term "maternal" in relation to the inheritance of coiling in snail-shells, thus by an attempted simplification confusing the case with true maternal inheritance. The important feature of these experiments was the demonstration that when the point of fixation for a character, which is in fact transmitted in the normal biparental manner, falls sufficiently early in ontogeny a pseudo-maternal or *delayed* effect is produced. Lastly, the index is not up to the high standard of the text, and in several cases the page references appear to be one page wrong.

However, such criticisms are not of great moment, and this new edition can be confidently recommended as a thorough and workmanlike example of what the authors intended it to be—a good text-book.

The book is well printed and produced; there are few misprints (a rather happy one occurs in the legend of fig. 56, p. 170, where chromosome reduction is stated to form "microscopes" instead of "microspores"), and the figures are clear and good.

C. D.

THE ANNALS AND MAGAZINE OF NATURAL HISTORY.

[ELEVENTH SERIES.]

No. 21. SEPTEMBER 1939.

XXIII.—*Two South African Holothurians with similar Calcareous Deposits.* By D. DILWYN JOHN, M.Sc., Department of Zoology, British Museum (Natural History).

It is remarkable that a *Cucumaria* which is very common between tide-marks at the Cape has not yet been recognized as a distinct species, and described. The deposits of its body-wall, which are of two kinds, bear a close resemblance to those of another holothurian, *Cucumaria frauenfeldi* Ludwig, equally common at the Cape. There is nothing in the references to *C. frauenfeldi* to suggest that the species here described as new has been confused with it. The external appearances—the shape, the colour, and the arrangement of the tube-feet—as well as the calcareous rings, of the two species are quite different, so that confusion would not be easy. In the notes on *C. frauenfeldi*, which follow the description of the new species below, it is shown that although the superficial deposits of its body-wall are generally similar to the corresponding deposits of the new species, they are easily distinguished from them.

Cucumaria stephensoni, sp. n. (Figs. 1–4.)

Material.—Seventeen specimens collected at St. James, False Bay, on August 26th, 1938. From Professor T. A. Stephenson.

Ann. & Mag. N. Hist. Ser. 11. Vol. iv. 21

Three specimens from Somerset West, False Bay, received in the British Museum in 1898, and two from "South Africa" received in 1877. They had remained unidentified until now.

Occurrence.—Known with certainty only from False Bay, but Professor Stephenson writes in a letter that these "black holothurians" occur "in countless millions all round these coasts, in pools and crevices and in the roots of *Caulerpa*."

External characters.—The best expanded of the larger specimens are 130 mm. long and 20 mm. in diameter. The mouth and anus are terminal. In the fresh material the dorsal side is uniformly black. The ventral side may be as dark, but it is often somewhat lighter, a deep blue-black. The ventral tube-feet are light in colour (see below). The three specimens which have been in spirit for over forty years are a deep brown, those which have been sixty years in spirit are a light yellowish brown. The body-wall is smooth and fairly thin, but it is tough and leathery. There are usually ten, but sometimes nine or eleven, tentacles. There are no anal teeth.

The tube-feet are quite retracile. Those of the ventral side are confined to the ambulacra, but in broad irregular rows, five to eight wide. Many are extruded. They are long, narrow, and thin-walled, with strongly swollen ends. The tubes are whitish in colour; the centre of the sucking-disk is white, but it is encircled by a rim of black pigment. The tube-feet of the dorsal side are small and retracted. They are usually numerous and scattered without trace of order over the whole surface. In some young specimens there is a clear double row in each radius with a few tube-feet scattered on either side of them; in other specimens there are distinct radial rows and more numerous tube-feet on either side of each, but a narrow bare space in the dorsal inter-radius. The sucking-disks are black.

Internal Anatomy.—The calcareous ring is simple, consisting of ten similar long triangular pieces; the interradials are as long as, but slightly narrower and more pointed than, the radials. The stone-canal is short and lies in the dorsal mesentery. The madreporite is free to the right or left of the mesentery. In one specimen it is kidney-shaped and deeply cleft into two leaves;

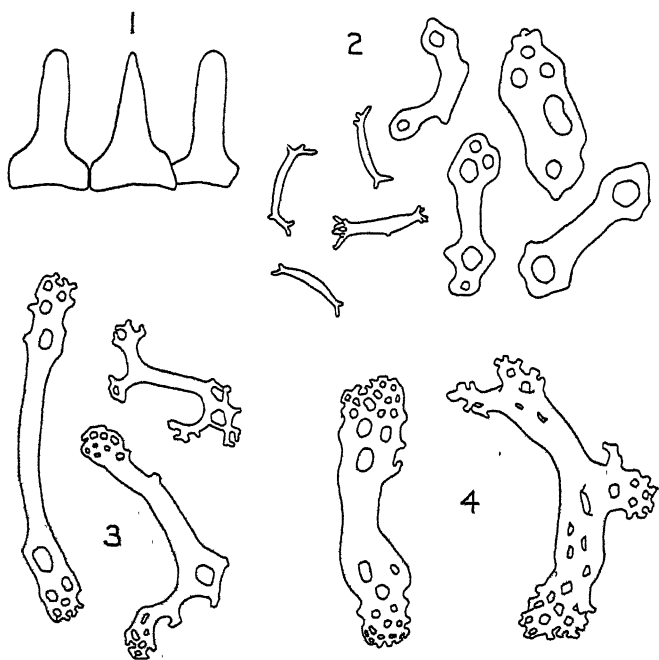
in two others it is divided by clefts into three parts. The polian vesicles appear to be very variable in size and number. In one of the three dissected specimens there are two, each 10 mm. long, one in the left ventral, the other in the right dorsal, interradius. In the second there are four, one in each interradius except the dorsal. Those in the left and right dorsal interradii are large, 15 and 11 mm. long respectively, while those in the ventral interradii are only 5 and 3 mm. long. In the third specimen there are no less than eight vesicles. There is one in the left dorsal, and one in the left ventral, interradius, 10 and 4 mm. long respectively. There are three in both the right ventral and the right dorsal interradii; those in the former are large, those in the latter very small.

The retractor muscles join the longitudinal muscles one-third to one-half of the way from the anterior end of the body, farther back in the dorsal than in the ventral radii. There is a short strongly muscular stomach. The last loop of the intestine is attached in the left ventral interradius. The respiratory trees are long and richly branched. The gonads are long unbranched tubes; those of the females contain eggs up to 0.4 mm. in diameter.

Calcareous Deposits.—The calcareous deposits of the body-wall are of two kinds. There is an outer and very dense layer of short straight or slightly curved rods, 0.04 to 0.06 mm. long. The shafts of the rods are usually slightly swollen in the middle. Many are simply forked at the end; in an equal or greater number one or more of the four primary branches are forked again. In the slightly curved rods two of the primary branches, one at each end, and on the same side of the rod, are often longer than the others; they occur on that side which accentuates the curve of the rod. The terminations of the branches are triangular and bluntly pointed; they hardly ever meet and fuse so as to form perforations; they may be studded with small knobs. Thorn-like branches sometimes arise from the shaft of the rod.

There is an inner and almost equally dense layer of larger and stouter rods, 0.06 to 0.1 mm. long, with perforations at each end. These correspond to the spectacles or "eye-glasses" of *C. frauenfeldi*. At their simplest

they are straight rods with a swelling surrounding a large perforation at each end. There is often a second smaller perforation beyond the primary one; or there may be three or four nearly equal perforations at each end. The margins of the swollen ends of such rods are often irregular, being produced into blunt rounded prominences. Sometimes the swollen ends of the rods are out of line with the shaft, both being displaced in the



Cucumaria stephensoni, sp. n.

Fig. 1.—Calcareous ring, two radials and one interradial.

Fig. 2.—Rods from the body-wall.

Fig. 3.—Larger rods from the tube-feet.

Fig. 4.—Rods from the tentacles.

same direction. The two ends of one rod may be unequally developed. In one specimen many of the "rods" have an irregular plate-like character, with two or three or more unequal perforations.

The walls of the tubes of the tube-feet have no calcareous deposits. The disk (of those of the dorsal as

well as of the ventral side) is supported by an end-plate with a diameter only one-third to one-half of its own. Around it, in the pigmented rim, are deposits of two kinds, the more numerous being small rods like those of the body-wall. There is a much smaller number of larger rods, 0.1 to 0.2 mm. long, of variable shape. They have slender and straight or curved shafts. The ends of the simplest are expanded and perforated with holes of various sizes, the more distal being the smaller. In more complex rods the shaft is branched near the ends, and the ends of the branches expanded and perforated. The margins of the expanded ends may be very uneven. There are no "spectacles" in the tube-feet.

The tentacles, also, contain numerous deposits. There are short rods like those in the body-wall but with perforated as well as forked ends; and larger stouter rods or plates, up to 0.2 mm. long, with numerous perforations and indented margins at both ends, or at the ends of irregular branches.

Cucumaria frauenfeldi Ludwig. (Figs. 5 & 6.)

Cucumaria sp., Semper, 1868, p. 236, pl. xxxix. fig. 22.

C. frauenfeldi Ludwig, 1882, p. 130.

C. posthuma Lampert, 1885, pp. 248-9, fig. 52.

C. frauenfeldi Théel, 1885, p. 109.

C. posthuma Théel, 1885, p. 265.

C. frauenfeldi Ludwig, 1887, p. 1231; Britten, 1910, pp. 239-40; Vaney, 1911, p. 26, figs. 1-3; Clark, 1923, p. 413; Hogben & Lingen, 1928, pp. 292-4.

History.—The descriptions of this species are scattered. Semper's specimen was from Java; he gave no description of it apart from figuring the "fairly numerous particles in its skin." Ludwig had three specimens, one from the Cape and two from unknown localities, which he considered to be identical with the Java specimen because of the similarity in the calcareous particles. He gave the species a name but added nothing to its description. Lampert identified specimens from the Cape with Semper's unnamed *Cucumaria* from Java but, ignorant of Ludwig's work, gave them a new name. He gave a fairly complete description and a figure of the calcareous particles. Théel pointed out that *posthuma* was a synonym of *frauenfeldi*. Ludwig recorded thirteen specimens from Angra Pequena. Britten had thirteen specimens from Luderitz Bay, and made considerable additions to

Lampert's description: Vaney appears to have been unaware of Britten's publication. He re-described the species on the basis of one specimen from Mossamedes, Angola, which he compared with one of Ludwig's original specimens; he gave figures of the deposits of the body-wall and pedicels as well as of the calcareous ring. Clark seems not to have known of Vaney's work; he re-described the calcareous particles but gave no figures. The paper by Hogben & Lingen is physiological.

No other references to this species have been found except for those in the recent series of "Papers on the Ecology of the South African Coast," nos. 1-7 (1937 and 1938, Trans. Roy. Soc. S. Africa and Ann. Nat. Mus.), recording its distribution on the South African coasts.

No one has re-examined Semper's type-specimen from Java, which is in the Vienna Museum, but I have, through the kindness of Dr. Herbert Graf, been sent a portion of its body-wall. I find the calcareous particles to be identical with those of specimens from the Cape. The species has not since been recorded from East Indian seas. If the Vienna specimen is indeed of the same species as the South African specimens, one can only wonder if it did come from Java.

Despite these many descriptions I consider it worth while, having abundant material, to add the following notes.

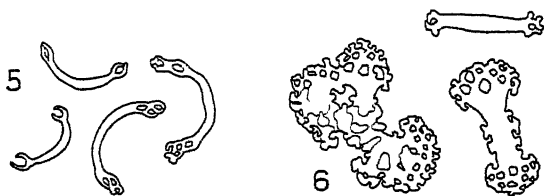
Material.—In the British Museum (Natural History) there are 28 specimens. Two were received from South Africa in 1877. The remaining 26 were recently sent by Professor T. A. Stephenson: 10 are from East London, 10 from Muizenberg, and 6 from Lambert's Bay.

Remarks.—The biggest specimen is 60 mm. long and 40 mm. in diameter (Britten recorded one 90 mm. long). The ends of the body are upturned so that the trivium is strongly convex and the bivium flat or even concave. The area of the former is far greater than that of the latter. The two specimens which have been preserved for 60 years are a light mottled yellowish brown. The new specimens probably retain much of the colour in life. The dorsal surface is blackish, deep brown or, most commonly, bluish grey. The ventral surface is mostly, but not always, lighter; in those specimens

with bluish backs it may be a dirty white. The dorsal tube-feet are usually as dark as the dorsal surface, whereas the ventral tube-feet are usually lighter than the ventral surface. There are ten tentacles of equal size.

The tube-feet are confined to the ambulacra. They are stout and retractile but the ventral are not usually retracted. The dorsal are in two irregular rows, sometimes widening to three, in each ambulacrum; they are not closely placed. The ventral are in two to four crowded rows in each ambulacrum.

One specimen is abnormal. It has four, not three, symmetrically arranged ambulacra on the ventral surface. Further, one of these—that which may be described as the left median-ventral—divides into two about half-way along the body, and the two branches continue to the posterior end.



Cucumaria frauenfeldi.

Fig. 5.—Smaller rods from the body-wall.

Fig. 6.—Rods and plates from the tentacles.

The calcareous ring—figured by Vaney—is characteristic. Lampert and Vaney gave the number of polian vesicles as one. I find one in each of two specimens, three in another, four in a fourth.

The calcareous deposits of the body-wall are of two kinds, corresponding to those of *C. stephensoni* and of the same size: a superficial layer of small rods and a deeper layer of spectacle-like plates. The smaller rods are, however, easily distinguished from those of *C. stephensoni*. They are usually bent, most often strongly so. The ends are forked, the branches curving in towards one another; or they are expanded and perforated by one or many holes, which come into being through the branches crossing and fusing. This gives the spicules a characteristic appearance. The spectacle-like plates are very like

those of *C. stephensoni*. Some irregular perforated plates occur in small numbers with them.

The tube-feet have no end-plates. Their walls are richly supplied with the small curved rods which occur in the body-wall. In the rim of the sucking-disk are rods of the same size, or slightly larger, of a different character. Their shafts are straight; the ends are richly branched, or they are expanded and pierced by one or many holes and have irregular margins.

The tentacles have deposits of other kinds. The simplest are dumbbell-like, with one perforation each end. The most complex are rods or plates with uneven surfaces, numerous perforations, and strongly crenulate margins; they are up to 0.09 mm. long.

C. frauenfeldi is known on the west and south coasts of Africa from Mossamedes to East London.

I sent a specimen of each of these species to Dr. Heding of Copenhagen, inviting him, with his great knowledge of holothurians, to describe the new form. He was too busy, but he examined and compared the specimens and generously sent me his notes and sketches with permission to make full use of them. Although I have dissected my own specimens and have had new drawings prepared I thank Dr. Heding most heartily.

When this paper was in proof I received additional specimens of both species, and notes on their habits and appearance in life, from Miss Joyce Eyre of the University of Cape Town. The following accounts are based on her notes:—

Cucumaria frauenfeldi nearly always occurs in sand, low down on the shore in positions which are exposed at low water of springs, but where the sand is always damp. It is usually buried in the sand, but it may occur under stones or be firmly wedged into sand-filled crevices in sheltered positions between stones. It is moderately common, but not so abundant as *C. stephensoni*.

The body is long and solid and usually U-shaped. The colour is pinkish or pale grey, mottled (sometimes irregularly) with fine dark markings. The oral disk is dark reddish brown; the bases of the tentacles are mottled with chalky marks; the ends of the tentacle branches are greenish brown.

Cucumaria stephensoni is not usually associated with sandy habitats, nor does it live firmly wedged into crevices. It tends to congregate in large numbers round the sides of stones and rocks where it is not subjected to exposure.

The body is soft and flabby and not U-shaped. The colour—including the tentacles and the area around the mouth—is a uniform brown- or blue-black.

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XXIV.—*New Lymantriidæ (Lepidoptera, Heterocera) from Asia and the East Indies.* By C. L. COLLENETTE, F.R.E.S.

[Plate XII.]

THIS paper deals with Lymantriidæ from Tibet, China, Upper Tonkin, and the Philippines.

Included in the paper are several species from an extensive and interesting collection made by Dr. H. Höne (the fifth collection from this source), and received from the Zoological Institute of Bonn University, wherein the types are deposited.

Types of the remaining insects are in the British Museum (Natural History).

Euproctis hypænops, sp. n. (Pl. XII. fig. 12.)

♂. Palpus bistre, mixed sparsely with pale pinkish buff. Antennal shaft white, pectinations cinnamon-buff. Head pale pinkish buff. Thorax and basal half of abdomen

white, distal half of abdomen fuscous ; anal tuft tawny. Pectus, venter and legs pale pinkish buff to white. Upper side of both wings, and fringes, shining white, the basal third of costa in the fore wing narrowly edged with fuscous. Under side of fore wing fuscous, with a border of white along the inner margin, broadest at the base and not reaching the tornus ; fringe white. Under side of hind wing and fringe white.

♀ Resembles the ♂, but with palpus and head white, and with fore wing entirely white.

Expanse : ♂♂, 36–39 mm., ♀ 42 mm.

1 ♂ (holotype), 1 ♀ (allotype), and 3 ♂♂ (paratypes), 3800 metres, June to September 1936, lower virgin forest zone, Batang, Tibet ; Höne collection.

Superficially resembles *Euproctis divisa* Walker, 1855, but easily distinguished by the absence of vein *M*2 in the hind wing. The basal half of the abdomen is white, and the fuscous on the under side of the fore wing in the male extends over the whole wing excepting the fringe and a narrow portion along the inner margin.

Euproctis parva, sp. n. (Pl. XII. fig. 10.)

♂. Palpus, antennal shaft, head and thorax capucine-yellow, pectinations of antenna Sudan-brown. Abdomen above and beneath, pectus, and legs light orange-yellow, the fore leg darker. Fore wing deep chrome ; an almost straight medial fascia, slightly darker than the ground-colour, edged narrowly both proximally and distally with pale orange-yellow ; fringe pale orange-yellow. Hind wing Prout's brown, lighter in the basal half of the costal area ; fringe light orange-yellow. Under side of fore and hind wing Prout's brown ; fringe, costa, and inner margin light orange-yellow to pale orange-yellow.

Expanse : ♂♂, 16 to 19 mm.

1 ♂ (holotype) and 1 ♂ (paratype), 500 metres, 1st and 2nd July, 1937, Shaowu, Fukien (*J. Klapperich*) ; Höne collection.

Related to *Euproctis dana* Swinhoe, described from Kashmir.

Euproctis yunnana, sp. n. (Pl. XII. fig. 6.)

♂. Palpus light buff, on the outer and upper sides Prout's brown. Antennal shaft pale pinkish buff, pectinations ochraceous-buff. Head, thorax, and base of abdo-

men light buff to warm buff, remainder of abdomen cinnamon-brown, anal tuft warm buff. Pectus, venter, and legs light buff. Fore wing pale pinkish buff; whitish antemedial and postmedial fasciæ, bowed, convexity terminad, approximately equidistant throughout their length; basal third of wing suffused with pinkish buff, and with some bistre irroration towards the inner margin; middle third of wing, between the two faciæ, suffused with pinkish buff and rather thickly covered with bistre irroration, which does not reach the costa; some faint pinkish buff suffusion on the distal side of the postmedial fascia; fringe whitish. Hind wing and fringe whitish. Under side of fore wing above the lower margin of the cell and vein *Cu*2, sayal-brown, with a darker line along the basal half of the costa; remainder of wing and fringe, whitish. Under side of hind wing and fringe whitish.

Expanse: ♂♂, 34–35 mm.

1 ♂ (holotype), 2 ♂♂ (paratypes), 1914, Teng-yueh-ting, W. Yunnan (*H. M. Bouring*); British Museum, ex Joicey collection.

Related to *Euproctis subfuscata* Hampson.

Euproctis tanaocera, sp. n. (Pl. XII. fig. 13.)

♂. Palpus light buff. Antennal shaft light buff, pectinations pinkish buff. Head, thorax and abdomen, maize-yellow. Pectus, venter, and legs light buff. Fore wing baryta-yellow; a very faint patch of amber-brown in the inner marginal area, at one-fourth of the inner margin; a larger patch of amber-brown in the inner marginal area, below the origin of vein *Cu*2, at two-thirds of the inner margin; fringe baryta-yellow. Hind wing, under side of both wings, and fringes pale pinkish buff.

Expanse: ♂♂, 31–34 mm.

1 ♂ (holotype), 1899, Moupin; 1 ♂ (paratype), 1900, Siao-lou; British Museum, ex Oberthür collection.

Resembles *Euproctis unipuncta* Leech, but has no spot in the apex of the fore wing. The antennal shaft is also considerably longer than in that species, and vein *Cu*1 in the fore wing further from vein *M*3.

The larger patch of amber-brown on the inner margin of the fore wing is nearer to the tornus than in *Euproctis trifasciata* Moore and *Euproctis leucozona* Collenette.

Euproctis pinoptera, sp. n. (Pl. XII. fig. 15.)

♂. Antennal shaft pinkish buff, pectinations cinnamon-buff. Palpus, head, thorax, and base of abdomen light buff to warm buff, remainder of abdomen vinaceous-buff. Pectus, venter, and legs pale pinkish buff. Fore wing Naples yellow; medially on the inner margin a triangular patch of buckthorn-brown irrorated with Prout's brown, its point at the origin of vein *Cu*2, its proximal side oblique inwardly to the inner margin of the wing and its distal side at right-angles to the inner margin; fringe Naples yellow. Hind wing, under side of both wings, and fringes pale pinkish buff.

Expanse: ♂, 37 mm.

1 ♂ (holotype), 900–1000 metres, Muong-Khuong, Province Laokay, Upper Tonkin; British Museum, ex Joicey collection.

Euproctis chrysosoma, sp. n. (Pl. XII. figs. 11 & 14.)

♂. Palpus pale pinkish buff, on the outer side Sudan-brown. Antennal shaft, head, and thorax above and beneath, pale pinkish buff; pectinations of antenna cinnamon-buff. Basal segments of abdomen pale pinkish buff, the remainder orange-buff. Legs pale pinkish buff, inner side of fore tibia orange-buff. Upper side of both wings pale pinkish buff, fringes whitish; inner marginal area of hind wing tinged with pale yellow-orange. Under side of both wings pale pinkish buff, fringes whitish; a broad band of Sudan-brown along the costa of the fore wing, the remainder of the wing slightly shaded with the same colour.

♀. Resembles the ♂, but the palpus, legs and under side of fore wing entirely pale pinkish buff.

Expanse: ♂, 36 mm., ♀♀, 39–48 mm.

1 ♂ (holotype), 1895, Tse-kou, S.W. of Ta-tsien-lou, (*R. P. Dubernard*); 1 ♀ (allotype), 1901, Ta-tsien-lou (*R. P. Dejean*); 2 ♀♀ (paratypes), 1896 and 1902, Siao-lou (*R. P. Dejean*); 1 ♂, 1917, Bahand, Yunnan (*Père Ouvrard*); 1 ♂, Teng-yueh-ting, W. Yunnan (*H. M. Bouring*); 2 ♂♂, Vrianotong, Tibet; British Museum, ex Joicey and Oberthür collections.

Distinguished by the orange-buff abdomen with pale pinkish buff basal segments, and in the ♂ by the Sudan-brown shading in the costal area of under side of fore wing.

Euproctis diploxutha, sp. n. (Pl. XII. fig. 4.)

♂. Palpus pale orange-yellow. Antennal shaft antimony-yellow, pectinations buckthorn-brown. Head, thorax, and abdomen above and beneath, and legs, warm buff to antimony-yellow, tegula light orange-yellow. Fore wing light orange-yellow; a spot of xanthine-orange below the cell midway between the base of the wing and the origin of vein *Cu*2; four interneural xanthine-orange spots postmedially, in line, from below the origin of vein *R*5, outwardly oblique, to above vein *Cu*1; a double spot of the same colour, more proximad, between vein *Cu*2 and the anal vein; fringe light orange-yellow. Hind wing and fringe, under side of both wings and fringes, cream-colour to light buff; basal two-thirds of costa of fore wing edged beneath with light orange-yellow.

Expanse: ♂ 23 mm.

1 ♂ (holotype), 1914, Teng-yueh-ting, W. Yunnan (*H. M. Bowring*); British Museum, ex Joicey collection.

A very distinct species, with xanthine-orange markings on the fore wing. It may be placed near to *Euproctis labecula* Wileman.

Euproctis melanchroma, sp. n. (Pl. XII. fig. 16.)

♂. Palpus Prout's brown. Pectinations of antenna pinkish buff. Antennal shaft, head, thorax, and abdomen above and beneath, and legs, light buff to warm buff, mixed on fore leg with cinnamon-brown. Fore wing warm buff; base of costa narrowly edged with cinnamon-brown; some sparse cinnamon-brown irroration over the whole wing; a faint cinnamon-brown post-medial fascia, bowed, convexity terminad, from vein *M*2 to vein *Cu*1, thence bowed, concavity terminad, to inner margin; fringe light buff. Hind wing and fringe light buff. Under side of both wings and fringes light buff, the fore wing slightly darker; basal half of costa of fore wing cinnamon-brown.

Expanse: ♂♂, 21–28 mm.

1 ♂ (holotype), 5500 feet, 16th December, 1912, Sapiangao, and 1 ♂ (paratype), 5000 feet, 16th June, 1913, Banguio: both subprovince Benguet, Luzon (*A. E. Wileman*); 1 ♂ (paratype), Los Baños, Philippines (*P. I.*

Baker); British Museum, ex Wileman and Baker collections.

Vein *R*5 is absent in the fore wing.

Euproctis tridens, sp. n. (Pl. XII. fig. 7.)

♂. Palpus and antennal shaft pale orange-yellow, pectinations cinnamon-buff. Head and thorax light orange-yellow. Abdomen above and beneath, pectus, and legs pale orange-yellow, mixed on the fore leg with light orange-yellow. Fore wing light orange-yellow; the interior of the wing wood-brown irrorated sparsely with fuscous; three interneural projections from this area towards the termen, between veins *R*5 and *M*1, *M*3 and *Cu*1, and *Cu*2 and the anal vein, tipped with a few dark metallic scales; the edge of the wood-brown area towards the costa strongly bowed in its basal half, thence running parallel with and almost touching the costa for some distance; fringe light orange-yellow. Hind wing and fringe pale orange-yellow; the medial area of the wing to the base faintly shaded in some specimens with wood-brown. Underside of both wings and fringes pale orange-yellow; the medial area of the fore wing to the base, excepting a narrow band along the costa and broader bands along the termen and inner margin, filled in with wood-brown.

♀. The wood-brown area of the fore wing lighter in colour, and the interneural projections between veins *R*5 and *M*1, and *M*3 and *Cu*1, produced further towards the termen, the latter invading the fringe.

Expanse: ♂♂, 30–37 mm., ♀♀, 36–38 mm.

1 ♂ (holotype), 1 ♀ (allotype), 83 ♂♂ and 1 ♀ (paratypes), 3000 metres, May–July 1937; 17 ♂♂ (paratypes), 4000 metres, June–August 1936; A-tun-tse, North Yunnan; Höne collection.

In the male genitalia a sharp spine projects from each side of the base of the uncus, from which condition the name of the species has been taken.

May be placed near to *Euproctis scintillans* Walker.

Euproctis tristicta, sp. n. (Pl. XII. fig. 9.)

♀. Palpus pinkish buff, on the outer side snuff-brown. Antennal shaft pinkish buff, pectinations sayal-brown. Head, thorax, and abdomen antimony-yellow to warm

buff, anal tuft ochraceous-tawny. Pectus, venter, and legs pinkish buff. Fore wing buff-yellow; basal third of wing, excepting narrowly along the costa, pinkish buff irrorated with snuff-brown; a bistre spot on the discocellulars; a postmedial fascia composed of snuff-brown irroration, broken at the veins, parallel with the termen from costa to vein *Cu*2, thence inwardly oblique to the inner margin; two conspicuous bistre subterminal spots, between veins *R*5, *M*1, and *M*2; fringe buff-yellow. Hind wing, under side of both wings, and fringes, light buff; some faint sayal-brown irroration in and beyond the postmedial area of fore wing.

Expanse: ♀, 52 mm.

1 ♀ (holotype), 900–1000 metres, Muong-Kuong, Province Laokay, Upper Tonkin; British Museum, ex Joicey collection.

May be placed near to *Euproctis curvata* Wileman.

Euproctis telephanes, sp. n. (Pl. XII. figs. 5 & 17.)

♂. Palpus light buff, on the outer side cinnamon-brown. Antennal shaft warm buff, pectinations buckthorn-brown. Head, thorax, and abdomen light orange-yellow, anal tuft orange-buff. Pectus, venter, and legs light buff. Fore wing buff-yellow; very faintly indicated antemedial and postmedial fasciæ of maize-yellow, joined below vein *Cu*2; some sparse cinnamon-brown irroration medially from the origin of vein *Cu*1 to the inner margin, also near the inner margin on the proximal side of the antemedial fascia and the distal side of the postmedial fascia; a conspicuous mummy-brown spot on the discocellulars; fringe maize-yellow. Hind wing and fringe pale pinkish buff, the inner marginal area slightly tinged with buff-yellow. Under side of both wings and fringes pale pinkish buff, costa and fringe of fore wing tinged with buff-yellow.

♀. Resembles the ♂, but the palpus relatively longer and entirely light buff.

Expanse: ♂ 33 mm., ♀♀, 44–45 mm.

1 ♂ (holotype), 1 ♀ (allotype) and 1 ♀ (paratype), Nanking, Province Kiang-su; British Museum collection.

Resembles *Euproctis inconspicua* Leech (type ♀, Kia-ting-fu, Szechwan), which has a longer and thinner third segment to the palpus, an almost obsolete discocellular

spot, and a broader but less complete medial fascia on the fore wing.

Euproctis leucorhabda, sp. n. (Pl. XII. fig. 1.)

♀. Palpus pinkish buff. Antennal shaft pale pinkish buff, pectinations sayal-brown. Head and thorax raw sienna. Abdomen snuff-brown, anal tuft ochraceous-buff. Pectus, venter and legs light buff to warm buff. Fore wing cadmium-yellow, sparsely irrorated with Brussels-brown; veins broadly outlined with white; fringe cadmium-yellow. Hind wing snuff-brown, veins in the terminal area light buff; fringe light orange-yellow. Under side of both wings light buff, heavily irrorated, except in the terminal areas, with sayal-brown; fringes light orange-yellow, this colour also invading the wing area interneurally in the fore wing.

Expanse: ♀, 57 mm.

1 ♀ (holotype), Antiago Valley, West Sumar, Philippines (I. I. Mounsay); British Museum, ex Joicey collection.

Related to *Euproctis albovenosa* Semper.

Dasychira glaucinoptera batangensis, subsp. n.
(Pl. XII. fig. 8.)

♂. Differs from *D. g. glaucinoptera* (West Tien-mu-shan, Chekiang) principally in the different shape of the antemedial fascia of the fore wing, which follows the same general direction from costa to inner margin, but is quite straight from the lower margin of the cell to the inner margin. The postmedial fascia between vein *Cu*₂ and the anal vein does not project so far towards the base of the wing, and the colour of the wings is rather darker and more uniform.

Expanse: ♂♂, 42–46 mm.

1 ♂ (holotype) and 4 ♂♂ (paratypes), 3800 metres, August and September 1936, lower virgin forest zone, Batang, Tibet; Höne collection.

Dasychira planozona Collenette, 1936.

In 1936 I described this insect from a series taken at Li-kiang, North Yunnan, at an elevation of 8500 to 10,000 feet. In the present Höne collection there is a series of 28 ♂♂ and 8 ♀♀ taken at A-tun-tse, North Yunnan, at

an elevation of 3000 to 4000 metres (9850 to 13,100 feet). These do not appear to differ structurally, but are smaller, with an expanse of 34 to 39 mm. in the ♂♂, and 38 to 40 mm. in the ♀♀. Some specimens of both sexes have a greyish tinge in the area between the antemedial and postmedial areas. The insects probably represent a local race, perhaps influenced by the greater elevation, but are hardly distinct enough to receive a name.

Dasychira chekiangensis Collenette, 1938.

♀. Resembles the ♂, but with a larger patch of sayal-brown on the discocellulars of the fore wing.

Expanse : ♀, 46 mm.

1 ♀ (neallotype), 1600 metres, 11th June, 1932, West Tien-mu-shan, Chekiang ; Höne collection.

The species was described in 1938 from a series of ten ♂♂.

Dasychira cyrteschata, sp. n. (Pl. XII. figs. 2 & 3.)

♂. Palpus, antennal shaft, and thorax sepia, pectinations of antenna somewhat lighter. Abdomen above and beneath Saccardo's umber, dorsally on the basal segments sepia. Pectus and legs sepia mixed with Saccardo's umber. Fore wing Saccardo's umber, with the following sepia markings :—some indistinct spots subbasally ; an indistinct antemedial fascia, slightly bowed, concavity basad, from costa to anal vein, thence outwardly oblique to inner margin ; a faintly indicated outline to the discocellulars ; a slightly crenate postmedial fascia, bowed, concavity basad, from costa to vein *Cu*₂, thence oblique outwardly to the inner margin ; a series of subterminal interneural spots ; an indistinct preterminal fascia ; fringe sepia, Saccardo's umber at the vein-ends. Hind wing and fringe drab. Under side of both wings and fringes drab ; an indistinct sepia spot on the discocellulars of the fore wing, the fringe marked with sepia between the vein-ends.

♀. Fore wing above lighter than in the ♂, markings indistinct.

Expanse : ♂♂, 38–44 mm., ♀, 49 mm.

1 ♂ (holotype) and 33 ♂♂ (paratypes), 4000 to 4500 metres, July and August 1936 and 1937 ; 1 ♀ (allotype), 3000 metres, June 1937 ; all A-tun-tse, North Yunnan.

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2 ♂♂, August, 1935, Li-kiang, North Yunnan; Höne collection.

Previously confused with *Dasychira tenebrosa* Walker. The termen of the fore wing is more bowed and the antenna longer than in that species, the markings of the fore wing less distinct, and the postmedial fascia much less crenulate.

EXPLANATION OF PLATE XII.

- Fig. 1. *Euproctis leucorhabda*, sp. n., type ♀.
- Fig. 2. *Dasychira cyrteschata*, sp. n., allotype ♀.
- Fig. 3. — *cyrteschata*, sp. n., type ♂.
- Fig. 4. *Euproctis diploazutha*, sp. n., type ♂.
- Fig. 5. — *telephanes*, sp. n., type ♂.
- Fig. 6. — *yunnanana*, sp. n., type ♂.
- Fig. 7. — *tridens*, sp. n., type ♂.
- Fig. 8. *Dasychira glaucinoptera batangensis*, subsp. n., type ♂.
- Fig. 9. *Euproctis tristicta*, sp. n., type ♀.
- Fig. 10. — *parva*, sp. n., type ♂.
- Fig. 11. — *chrysosoma*, sp. n., allotype ♀.
- Fig. 12. — *hypænops*, sp. n., type ♂.
- Fig. 13. — *tanaocera*, sp. n., type ♂.
- Fig. 14. — *chrysosoma*, sp. n., type ♂.
- Fig. 15. — *pinoptera*, sp. n., type ♂.
- Fig. 16. — *melanchroma*, sp. n., type ♂.
- Fig. 17. — *telephanes*, sp. n., allotype ♀.

XXV.—On “*Melanoteuthis beebei*” Robson and the *Vampyromorpha* of the M.Y. ‘Rosaura’ Collections.
By GRACE E. PICKFORD, Ph.D., The Bingham Oceanographic Laboratory, Yale University.

DURING the summer of 1938 the author undertook a taxonomic revision of the types of *Vampyromorph* genera and species. The investigation was instigated to supplement an anatomical memoir based on immature but well-preserved specimens in the collection of the Bingham Oceanographic Laboratory. It had become apparent that previous descriptions of the known species and genera were wholly inadequate, and in order to identify the immature specimens under investigation it seemed essential to obtain thorough redescriptions of the types. The author has now seen not only Chun’s original specimens of *Vampyrotheuthis infernalis* in Berlin and Leipzig, but also the types of all other described

genera and species. The most important series of specimens are those of the Dana collections; in addition to named specimens of the 1921-22 expedition which were studied by Joubin (1937 and earlier references therein) there is a splendid series of as yet undescribed material brought back by the 1928-30 expedition. This collection is still under investigation, and will be reported on in a later contribution. Certain results must, however, be anticipated, since it appears probable that only a single species exists, the original *Vampyroteuthis infernalis* of Chun. All the other supposed genera and species are either distorted and damaged specimens or else stages in the life-history of this original species.

Characters to which taxonomic importance has previously been attached may be divided into three categories:—(1) Characters which were overlooked in previous descriptions but which can actually be shown to be present in all well-preserved specimens, *e. g.*, the various types of light organs and the vestigial arms or filaments. (2) Characters which are entirely the result of accidental injury or contortion of the specimen, *e. g.*, the supposed dorsal rotation of the oral face of the web in "*Retroteuthis pacifica*" Joubin. (3) Characters which are definitely correlated with the age of the animal, as indicated by mantle length, condition of gonads, etc. In this last category may be mentioned such characters as the number of suckers and number of primary gill-lamellæ, both of which increase with age. Most important of all is the number and position of the fin-pairs; the youngest specimens investigated have a single pair of fins, and the fin light-organs are situated in front of the fin base; this stage is represented in the species described by Joubin as "*Melanoteuthis schmidtii*." In slightly larger animals one can find the rudiments of an anterior fin-pair which is developing in front of the light organ. The next stage has two pairs of fins, and is represented by Chun's original type of *Vampyroteuthis infernalis*. In later stages one can trace the gradual regression and resorption of the posterior or larval fin-pair.

The object of the present contribution is to describe the specimens which were studied in the British Museum. These are: (1) Robson's type of "*Melanoteuthis beebei*," and (2) five young larvæ collected by Mr. J. S. Colman

on Lord Moyne's yacht M.Y. 'Rosaura,' 1937-38. My best thanks are due to the authorities for permission to examine these specimens, and to Mr. C. C. A. Monro, who provided me with every facility during the investigation.

"*Melanoteuthis beebei*" Robson.

This specimen was described by Robson (1929), and its status was further examined in conjunction with that of other Vampyromorphs in his 'Monograph of the Recent Cephalopoda' (Robson, 1932). It is in very poor condition, and permits only a limited number of supplementary observations.

Body proportions.—Robson points out that the body is squatter than in "*M. lucens*" Joubin; no importance can be attached to this character in view of the very damaged condition of the specimen.

Arms and web.—These are very damaged, and nothing can be added to Robson's original estimates of their proportions. He points out that the E sector of the web is not deeply incised as in "*M. lucens*." From the study of a large series of specimens the author is at present of the opinion that the web sectors are normally subequal in all Vampyromorphs, occasional apparent exceptions result from unequal states of contraction.

Suckers and cirri.—The exact number of suckers on the various arms cannot be definitely stated; Robson found eleven to thirteen. This is, of course, fewer than in "*M. lucens*" (a redescription of Joubin's type of this species will be published elsewhere), but since the latter is a much larger animal a larger number of suckers is to be expected. Robson found only six pairs of primary cirri, i. e., cirri unaccompanied by suckers, on the first arms, and compares this with the fourteen pairs stated to be present in "*M. lucens*" by Joubin. In the first place it must be observed that Robson is mistaken in his statement (see below), and in the second place I have found that the number of primary cirri in "*M. lucens*" is not so large on these arms as Joubin supposed (unpublished observations). In Vampyromorphs, generally, the number of pairs of primary cirri varies from five to nine and shows no correlation with age; moreover, the number may vary on different arms, even

in the same specimen. As far as can be determined the number of primary cirri in the type of "*M. beebei*" is as follows:—first right arm, eight pairs; first left arm, probably also eight pairs; third left arm, almost certainly only six pairs; third right arm, either six or seven pairs. None of the other arms are in sufficiently good condition to study.

Robson considers that the cirri of "*M. lucens*" are longer and more slender than in "*M. beebei*"; this statement should be supported by an index comparing their relative length in the two "species." In view of the uncertainty as to mantle length in the damaged "*M. beebei*" an index based on this standard measurement cannot be given. Instead one can make a comparison of cirrus length with diameter of eye-bulb (see below).

The index $\frac{\text{Max. cirrus length}}{\text{Diam. eye-bulb}} \times 100$ is, for "*M. lucens*," $\frac{6 \times 100}{23} = \text{ca. } 26.1$ (based on unpublished measurements); for "*M. beebei*," using Robson's length of longest cirrus and the eye-bulb diameter given below, $\frac{3.2 \times 100}{12.5} = \text{ca. } 25.6$.

It is obvious from these indices that there is no real difference between the two specimens, at least in this respect.

The suckers of "*M. beebei*" are described as pedunculate, those of "*M. lucens*" as sessile. As will be shown in a later contribution this character has little or no significance, depending on the state of contraction and conditions of preservation of the suckers.

Filaments.—These important structures were observed and described by Robson. In comparison with "*M. lucens*" he mentions differences in the relative length of basal and distal portions; this, of course, depends on how much of the distal or filamentous portion has been broken off. In all the Vampyromorphs examined I have only as yet discovered one case in which the tip of the filament was complete and uninjured, viz., in one of the filaments of the Berlin paratype of *Vampyroteuthis infernalis*.

Robson made a careful and most interesting study of the brain of this specimen, and among other things he

has described the origin of the filament nerve. His account differs from that given for "*Melanoteuthis schmidtii*" by Joubin (1929), who believed that the filament nerve arose from the pedal ganglion between the roots of the first and second brachial nerves. According to Robson, and I can substantiate his statement, the brachial nerves arise from a separate brachial ganglion, not from the pedal ganglion. On the other hand, Robson's statement that the filament nerve comes off from the pedal ganglion is apparently not quite correct. It certainly does not arise along with the other brachial nerves from the brachial ganglion, but its root passes backwards into the pedo-brachial commissure. This is concealed on the right but fully exposed on the left side. I shall attempt a more complete description of the Vampyromorph nervous system in an anatomical memoir which is now in preparation. At present one can only say that Robson's account of the filament nerve is more nearly correct than is that of Joubin.

Eyes.—The left eye has a maximum diameter of 12.5 mm.; the lens is about 6 mm. in diameter.

Fins.—Robson described the single pair of fins; there is no doubt, from their shape and the size of the animal, that they are the adult or anterior fin-pair. In comparing the fins with those of "*M. lucens*" Robson states that the line of insertion is narrower than the maximum breadth of the fin in this species, whereas in "*M. beebei*" the maximum breadth is at the insertion. He also notes that the fins of "*M. lucens*" are much larger and wider. In this connection it must be noted that in "*M. beebei*" the thin flexible anterior margin of the fins is so damaged that measurements of fin breadth are quite meaningless. According to my measurements the breadth of the fin at its insertion is 5.5 mm., not 6 mm. as given by Robson.

Light-organs.—No trace of fin light-organs remains; this is not surprising in view of the extremely damaged condition of the apex of the body. It would not be right to conclude that fin light-organs were originally absent; they are invariably found in well-preserved Vampyromorphs of all ages.

Robson appears to have observed the composite light-organs situated, as he states, "towards the base of the

second arms." The left organ was re-examined; it is of perfectly typical character, ca. 1.5 mm. long and ca. 0.75 mm. broad, and composed of about forty closely aggregated simple white points.

Simple light-organs are occasionally visible in the better-preserved fragments of skin.

Funnel.—Robson points out that the funnel is rather prominent in this species, whereas in "*M. lucens*" it is sunk beneath the tissues. A re-examination of the type of "*M. lucens*" shows that the funnel does actually project slightly, and no doubt much must depend on differences in the state of contraction.

Gladius.—Robson's figure of the shell represents the posterior half of a typical Vampyromorph gladius (unpublished observations). It is complete, and lies within the very damaged shell-sac; on account of the delicate condition of the specimen no attempt was made at further examination.

Internal anatomy.—Little can be added to Robson's original account. The sex of the specimen is not certain, but it is probably a young female. One can find the apical coelomic sac (a hitherto undescribed structure peculiar to Vampyromorphs) and also the origin of the suspensory ligament of the gonad.

Jaws and radula.—These were studied and described by Robson. I have made some additional measurements of the mandibles in order that indices may be compared with those of other Vampyromorphs. The figures will be reserved for a later contribution, when the Vampyromorph mandibles are fully described and the points chosen for measurement more exactly specified. It should be mentioned here, however, that the indices show a very close agreement with those of other specimens studied.

Vampyromorphs of the M.Y. 'Rosaura' Collection.

There are five specimens, captured from two different stations; all are young larvæ. They will be described individually.

(1) Stn. 28, 12. xi. 1937, 16° 44' N., 85° 42' W., ocean depth ca. 3000 m., 2 m. Stramin net, depth of gear ca. 1100-0 m., N. of Bonacca Is., J. S. Colman coll.; 3 specimens, all very badly rubbed, alcohol.

A note on the back of the label says "Body transparent colorless. Ink-sac and umbrella of tentacles, jet-black."

This transparent appearance was due to the fact that the skin has been almost completely rubbed away; the rectum, which was mistaken for ink-sac, is conspicuous.

Specimen 1.

Body measurements.—Mantle length = 8 mm.; mantle breadth = 4.5 mm.; interocular breadth = 6.5 mm.

Arms and Web.—In such poor condition that measurements would be of little significance.

Suckers and Cirri.—The third right arm has six pairs of primary cirri and three suckers; since the third sucker is minute it was probably the last. The fourth right arm has five pairs of primary cirri and four suckers; judging from the size of the fourth sucker there may originally have been a fifth very minute one. The other arms are in such poor condition that the suckers and cirri cannot be studied. The figures given above serve for comparison with those of other young *Vampyromorphs*.

Filaments.—Present; both are damaged, the right less so than the left.

Eyes.—Both are extruded from their sockets; the left is in very poor condition, the right is moderately well preserved although slightly elongated. Diameter of right eye-bulb = 1.8–2.0 mm.; diameter of lens = 1.1 mm.

Fins.—Rudiments of the developing anterior fin-pair are present. The posterior fins are not in very good condition; the right fin has a length of ca. 3.2 mm. and tapers gradually from the base towards its distal extremity. The left is even less well preserved.

Light-organs.—Both fin light-organs are present, situated in their normal position just medial to the anterior angle of insertion of the larval or posterior fins. A composite light-organ was found on the right side in its normal situation; that of the left is gone. In these small and poorly preserved specimens it is extremely difficult to be sure whether simple light-organs

are present; the rubbed condition of the skin precludes their discovery in this specimen.

Mantle-chamber and internal anatomy.—The mantle-cavity is very damaged, the gills being almost rubbed away. The sex is indeterminable. The apical coelomic sac can be seen.

Specimen 2.

This specimen is in even worse condition than the last; the skin and subcutaneous tissues are completely rubbed away from the back, thus exposing the shell-sac.

Body measurements.—Mantle length ca. 9.5 mm.; mantle breadth? ca. 4 mm.; interocular breadth = ca. 6.5 mm.

Arms, web, suckers, and cirri.—Too rubbed to study.

Filaments.—The left is projecting, the right concealed in its pocket.

Fins.—Although anterior fin rudiments may originally have been present, and from the size of the specimen one would suspect that this was the case, there is now no trace of them. The right posterior fin is completely rubbed away. The left posterior fin is hanging by some shreds of tissue and is rubbed ventrally; the fin light-organ is adherent near its anterior insertion angle.

Eyes.—The right eye is still within its socket and is probably better preserved than the left, in which the whole eye-bulb is elongated. Diameter of right eye-bulb = 1.9 mm., diameter of right lens = 1.1 mm.

Light-organs.—As mentioned above the left fin light-organ remains. Composite and simple light-organs could not be traced on account of the poor condition of the specimen.

Mantle-chamber and internal organs.—The gills are moderately well preserved and ca. 1.5 mm. in length. The left gill has six primary lamellæ in each demibranch; on the right the number of primary lamellæ could not be counted.

A small rudimentary ovary is seen through the exposed shell-sac when the animal is studied in dorsal view. The apical coelomic sac is also clearly visible, and one can trace the slender canal by which it communicates with the coelom proper.

Specimen 3.

This specimen is also very badly rubbed.

Body measurements.—Approximate mantle length = ca. 10 mm. (?+). The mantle breadth cannot be measured. Interocular breadth = 9.5 mm.

Arms, cirri, suckers.—The arms are too rubbed for description; a few suckers remain.

Filaments.—Both are present, broken.

Fins.—Very badly rubbed. Apparently there were originally two fin-pairs of which the anterior were the smaller; this is best seen on the right side, on the left the condition is confused. The right anterior fin is comparatively well preserved and retains its normal paddle-shaped form. The right posterior may originally have been long and tapering, but it is now very bent and rubbed.

Light-organs.—No trace of these remains, even the fin light-organs are wanting.

Mantle-chamber and internal organs.—The mantle-cavity has been everted and is in poor condition; the gills are very stretched and rubbed. An apical coelomic organ is present and the gonad has the appearance of a young ovary.

(2) Stn. 42, 21. xii. 1937, 5° 51' S., 35° 38' W., ocean depth 2600 m., 2 m. Stramin net, depth of gear 1200–0 m., off N.E. Brazil, J. S. Colman coll.: two young specimens, alcohol.

A note on the original label says "Body transparent gelatinous. Tentacles and eye black. Not unlike those caught at station 28." As in the case of the previous specimens the apparent transparency results from rubbing of the skin.

Specimen 1.

No accurate body measurements are possible on this very damaged specimen; it has an approximate mantle length of ca. 8 mm. The shell-sac is fully exposed dorsally. Both eyes are present but in poor condition. The sex is probably female, as the gonad looks like a young ovary. All traces of light-organs are gone.

Fins.—A slender tapering pair of posterior or larval fins is present. On the right side one can clearly see

the pinkish rudiment of an anterior fin. On the left side the anterior fin rudiment has been rubbed up, and lies in a tangle of skin near the posterior fin.

Specimen 2.

This is in rather better condition than the last, but still very poor.

Body measurements.—The mantle-sac appears to be unnaturally stretched; it has a length of ca. 12.5 mm. Mantle breadth=ca. 6 mm. Interocular breadth=7.5 mm.

Arms, web, suckers, and cirri.—Measurements of arm length and web depth are not possible with any degree of accuracy, but the number of suckers and primary cirri can be counted on some of the arms. The third left arm has six pairs of primary cirri and apparently four suckers. The third right arm has six pairs of primary cirri and four suckers, of which the last is a rudimentary knobbed papilla. The fourth right arm has six pairs of primary cirri and at least four suckers; it is possible that there may have been one more.

Filaments.—Both are present but of course broken short; they project from their pockets in the B sectors of the web.

Eyes.—These are not extruded from their sockets but can be studied through the transparent skin. They are directed diagonally forwards, a condition rarely observed. The left eye is better preserved; it has a diameter of 2.3 mm., the lens diameter=1.2 mm.

Fins.—The posterior or larval fins are well developed, tapering. In front of each is the rudiment of an anterior fin, still very small and of a pinkish-orange colour. The right posterior fin is ca. 3.5 mm. long, the left posterior ca. 4.5 mm. long.

Light-organs.—Fin light-organs are present, situated just medial to the anterior insertion of the larval fins. Both composite and light-organs are also present. Simple light-organs could not be demonstrated with certainty.

Mantle-chamber and internal organs.—The gills are in moderately good condition; the left is a little contracted, 1.4 mm. in length; the right is stretched and measures 1.6 mm. The left gill has six primary lamellæ

in each demibranch and a bifurcated terminal lamella. The number of primary lamellæ could not be counted accurately near the tip of the right gill.

The gonad looks like a rudimentary ovary; the oviducal openings could not be seen. There is no trace of a rudimentary penis, however, a structure which can usually be found in young males of this size.

Although these five young larvæ are in such poor condition they are nevertheless of interest. It is extremely rare to find well-preserved Vampyromorphs, and there are hardly any very young specimens known which are not rather seriously damaged. In the above account I have made no attempt to describe unnecessary characters, but have concentrated on things which will be of use in comparison with other larvæ. The condition of the specimens precluded any attempt to remove the gladius; alcohol preservation makes the shell soft while the surrounding tissues are hardened. Time did not permit removal of jaws and radula, nor did this seem desirable in view of the inevitable damage which would result to the specimens. Information derived from these larvæ will be incorporated in a subsequent study of the Vampyromorph life-history.

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XXVI.—*Descriptions and Records of Bees.*—CLXXXVI.

By T. D. A. COCKERELL, University of Colorado.

Nomia rubella Smith.

At Mlanje, Nyasaland, June 1913, Dr. S. A. Neave took a long series of female *N. rubella*, and with them three *N. fausta* Smith. The type of *N. rubella* is a male from Gambia, and it may be that we have erred in considering specimens from such distant localities as Natal to be *N. rubella*. At the British Museum I made the

following table of males with red abdomen and hind femora toothed beneath :—

Wings hyaline, broadly suffusedly dusky apically; first tergite reddish black; denticulation of hind tibiae very fine (two very closely allied species)	1.
Wings fuliginous; sixth tergite dark; hind basitarsi light	2.
1. Scutellum with two very large mammiform projections. (Betsileo, Madagascar.)	<i>bicolor</i> Sauss.
Larger; scutellum obtusely bigibbous. (Harrar, Abyssinia.)	<i>somalica</i> Friese.
2. First tergite dusky, broadly black at base ..	<i>pulchritarsis</i> Cam., [(Transvaal.)
First tergite clear red, black at base	<i>rubella</i> Smith, type.

Meade-Waldo (1916) introduced the name *N. pulchritarsis*, from Cameron's manuscript, as a synonym of *N. rubella*. Comparing the specimens, I agreed with Meade-Waldo that they were conspecific, but it may well be that *pulchritarsis* represents a distinct race, apparently not identical with any of those described below. A close comparison of specimens in my collection referred to or associated with *N. rubella* brings out the following differences :—

Males	1.
Females	4.
1. Hind tibiae pale testaceous, with a large pale brown cloud on each side; hind tarsi pale rufo-testaceous, the apical joints scarcely at all darkened; wings strongly reddened; first tergite bright red, suffused with blackish at extreme base; rugæ of area of metathorax coarse. (Zanzibar.)	<i>A.=pallidior</i> , nov.
Hind tibiae and small joints of tarsi black or nearly so; hind basitarsi pale yellowish, contrasting	2.
2. First tergite reddish black, with only the depressed hind margin ferruginous; wings dark fuliginous, with violet iridescence; tegulae rather large, black, with brownish margins; rugæ of metathoracic area rather coarse. (Mfongosi, Zululand, <i>W. E. Jones</i> .)	<i>B.=jonesi</i> , nov.
First tergite red, with the descending portion strongly blackened	3.
3. Wings dark fuliginous, with splendid violet iridescence in the cells only; tegulae black, smaller than in B; striæ of metathoracic area rather coarse; mesonotum conspicuously shining between punctures. (Matopo Hills, S. Rhodesia, <i>J. Ogilvie</i>)...	<i>C.=matopicola</i> , nov.
Wings paler, strongly reddened (much as in A); tegulae rather large, rufous, darkened	

- on inner side; striæ of metathoracic area very fine and dense; mesonotum hardly at all shining. (Winklespruit, Natal, *C. N. Barker.*) D.=*erythroptera* Ckll.
4. Striæ of metathoracic area extremely fine and dense, the area not sharply defined; scutellum not conspicuously polished; tegulæ small and black. (Bambili, Belgian Congo, *Dr. Rodhain.*) E.=*rodhaini* Ckll.
- Striæ of metathoracic area not so fine and dense, the area a slender very sharply defined band 5.
5. Tegulæ rather large, rufous, with pallid margins, and a large black spot anteriorly; tergites 1 to 3 with suffused blackish bands; scutellum highly polished. (Mlanje, Nyasaland, *S. A. Neave.*) F.=*nubicincta*, nov.
- Tegulæ smaller, black; wings darker; tergites 1-3 clear red, except that the first has the descending portion black; scutellum dullish, the tops of the swellings shining. (Mlanje, Nyasaland, *Neave.*) .. G.=*neavei*, nov.

I have before me eleven of form F from Mlanje, but only one of G.

I thought it possible that A, from Zanzibar, might prove to be *N. oberthurella* Sauss., based on a female 12.5 mm. long, but the red wings with pale red nervures are against it, and I do not think I have Saussure's bee. D is, I feel sure, the male of *N. erythroptera* Ckll., 1920, which was based on a female collected by Barker in Natal. For the others I have provided names; they may be treated for the present as subspecies of *N. rubella*. It seemed possible that G could be the female of C, but I think this is not the case. In C there is a shining groove down the middle of the scutellum, wholly wanting in G, and C has a much larger (quadrate) polished impunctate space at each side of the ocelli.

N. r. pallidior was received from Dr. Fries as *N. rubella*. *N. r. jonesi* was received from Fries as *N. notabilis* Schlett., an obvious mistake. These two Fries specimens are for the present in my collection, as is also the specimen of *N. erythroptera*. The type of *N. erythroptera* is in the U.S. National Museum.

The whole series illustrates the tendency of *Nomia* to break up into subspecies or closely related species, a tendency frequently noticed in other groups of the genus. For an earlier treatment of the group, see Rev. Zool. Bot. Afr. xxiii. (1932) p. 20.

Nomia notabilis Schletterer.

At Kampala, Uganda, C. C. Gowdey collected a long series of male *N. notabilis* with the characteristic spined scutellum. With these he got a single female which has short but very evident spines at sides of scutellum, and falls with *N. bicornigera* Strand. *N. bicornigera* was based on a female found west of Lake Albert; I have a male determined as *N. bicornigera* by Friese from the Cameroons. This male differs from *N. notabilis* by the light fulvous hind tibiae, but it may not be strictly identical with Strand's species. My impression is that *N. bicornigera* is the true female of *N. notabilis*, but, if so, we have the difficulty that the female *N. notabilis* is first in Schletterer's description, and would ordinarily be regarded as the type. I think I am justified in taking the male as the type, and so avoiding serious confusion. A reasonable excuse may be based on the probability that the great thoracic spines of the male suggested the specific name. Friese's citation of the locality is ambiguous; I understand that Schletterer's specimens were taken by Captain van Gèle somewhere in the region of the Congo.

Nomia chilwensis, sp. n.

♂ (type).—Length about 9 mm., anterior wing 7.

Head, thorax, and legs black, abdomen bright ferruginous, including extreme base; hair of head and thorax rather dull white, on face silky, dense, slightly yellowish, covering surface, dense on cheeks, forming conspicuous lines along hind borders of pronotum and mesonotum, a mark on axillæ, a band across postscutellum, and dense hair on mesopleura; flagellum moderately long, obscurely brown beneath; vertex dull and densely punctured, but a shining spot at each side of ocelli; mesonotum dull, densely punctured; scutellum bigibbous, unarmed, densely punctured, dull, the tops of the elevations shining; area of metathorax a curved narrow shining band, the plicæ well spaced; posterior truncation dull, thinly hairy; tegulæ rather large, with broad hyaline margins and a fulvous boss. Wings dusky hyaline, stigma dark brown, nervures very pale brown; second cubital cell small, receiving recurrent nervure little beyond middle. Hind femora not much swollen, but with a strong tooth beneath;

hind tibiæ narrow at base, gradually (not abruptly) enlarged to the very stout apical part. Abdomen dullish, except the shining pale golden depressed margins of tergites; punctures of abdomen small and weak. The hind tibiæ are not serrate.

♀.—Similar in appearance; flagellum short and stout, red at tip; mesonotum shining between punctures; scutellum glistening, feebly bigibbous; hind basitarsi broad.

Nyasaland: south-west of Lake Chilwa, Jan. 9–12, 1914, two of each sex (*S. A. Neave*).

Easily known from *N. serratipes* Friese (male) by the legs. *N. serratipes* seems to be a synonym of *N. serratula* Smith. The fourth sternite of the male has a median keel as in *N. latifacies* Strand, but that is a much smaller species.

Nomia chilwensis chiperonica, subsp. n.

♂.—Length about 9·5 mm.

Similar to *N. chilwensis*, but rather more robust, and easily separated by the light red hind tibiæ and basitarsi, the tibiæ serrate behind, very stoutly gradually enlarging, curved as seen from behind. The stigma is larger and redder and the second cubital cell much broader; the scutellum and mesonotum are more shining. The tooth on hind femur is very large.

Portuguese E. Africa: valley of Kola River, near E. Mt. Chipirone, 1500–2000 ft., type-locality (*S. A. Neave*); Ruvo Valley, 2000 ft., 1913 (*S. A. Neave*).

N. chilwensis is easily known from the group of *N. rubella* by the gradually (not abruptly) enlarged male tibiæ.

Nomia atopozona, sp. n.

♀.—Length about 10 mm., anterior wing 8·3.

Head and thorax black, legs obscurely brownish; abdomen brownish red; first tergite broadly black at base and with a black band, not nearly reaching sides, before the depression, the region between the band and the basal black strongly dusky; second tergite with a black subbasal band, longer than that on first but not reaching sides, constricted in middle, the shining apical depression dusky; third with the basal part pallid, yellowish, with no band, the broad apical depression

dusky; fourth like third, fifth black; face broad, covered with greyish-white hair; clypeus finely and densely rugoso-punctate, without any median keel (*N. somalica* Friese has a delicate median keel); flagellum short, red beneath at tip; a polished spot at each side of ocelli; hair of thorax dull white, faintly yellowish dorsally, forming distinct bands on hind margin of pronotum and mesonotum, very dense on tubercles, a mark at each side of scutellum and a band across postscutellum; the band on mesonotum posteriorly is broad and not sharply defined; mesonotum strongly punctured, glistening; scutellum bigibbous, with a strong median depression, the elevations shining; area of metathorax triangular, with dense but strong plicæ; posterior truncation thinly but conspicuously covered with light hair (it is covered with greyish hair in *N. somalica*); tegulæ black, not enlarged (enlarged in *N. somalica*). Wings strongly reddened, stigma dull red, nervures pale; second cubital cell very broad, receiving recurrent nervure not far from middle (it is received about middle in *N. semirufa* Friese). Legs with pale hair, a bright copper-red brush at end of the broad hind basitarsi; dark parts of first and second tergites excessively finely and densely punctured. Abdomen dull except the shining hind margins of tergites. The anterior spur of hind tibia is not abruptly bent at end as it is in *N. somalica*. Easily known from *N. chilwensis* by the finely sculptured triangular area of metathorax and the black band on second tergites.

British E Africa: L. Mpeketoni, near Kipini, March 4-5 1912 (*S. A. Neave*).

Nomia cinerea Friese.

Females from Little Karroo, 38 miles E. of Ceres (*Turner*), and Sterkfontein, Transvaal (*Thomasset*), differ in lacking the band of white tomentum in scutello-mesonotal suture; they possibly constitute a distinct race. The band is well developed in specimens from Willowmore (*Brauns*).

Nomia granularis Cockerell.

S.W. Africa: Okahandja, Jan. 1928 (*R. E. Turner*), ♀.
Ann. & Mag. N. Hist. Ser. 11. Vol. iv. 23

Nomia austrotegulata Cockerell.

S.W. Africa : Okahandja, Jan.-Feb. 1928 (*R. E. Turner*), ♂.

Nomia murinella Cockerell.

Bechuanaland : Lobatsi, March 16, 1934 (*J. Ogilvie*), ♀.
About 9 mm. long, with fulvous tegulæ.

Nomia fulvopollinosa, sp. n.

♀.—Length 10 mm., anterior wing 6.7.

Rather slender, black, with the hind tibiæ and basitarsi (the latter extremely broad) light red, the small joints of all tarsi red; tongue dagger-like, not long; orbits converging below; face and front covered with dull white hair; flagellum red beneath; mandibles dark or with a red spot in middle; thorax and scutellum dull, densely covered with fulvous tomentum; metathorax hairy, the basal channel linear and shining; tegulæ fulvous, not enlarged. Wings hyaline, the apical margin faintly dusky; stigma very small, pale yellowish with a dusky margin; nervures brown, second cubital cell about square, receiving recurrent nervure near end. Hind femora and tibiæ with a copious scopa. Abdomen moderately shining, the first tergite noticeably so, though finely and closely punctured; tergites 1 to 4 with broad apical bands of tomentum, the first three strongly reddened, the fourth usually white; second and third tergites, before the bands, with five reddish hairs, as if dusted with red pollen, but these are easily deciduous, and inconspicuous in some specimens; fifth tergite with dense black hair and a little white at sides, apex with dense black hair.

S.W. Africa : Gobabis, alt. 4647 ft., Dec. 16-17, 1933 (*J. Ogilvie*, *L. Ogilvie*), 5 ♀.

Related to *N. nitidibasis* Ckll., but much less robust, with no shining elevations on clypeus. In Strand's table it falls nearest to *N. katonana* Strand. The shining first tergite separates it at once from *N. leucomelanura* Ckll.

Nomia wylliei (Cockerell).

Bechuanaland : Palapye Road, March 5-6, 1934, 2 ♀ (*L. Ogilvie*).

I described this as a subspecies of *N. capensis* (Fries), but now think it is a distinct species. It is easily known from *N. fulvopollinosa* and related forms by the bare and intensely black metathorax, with long hair at extreme sides. The hind basitarsi are black.

Nomia patellifera nudiventris (Fries).

Orange Free State : Bosrand, Afdeling Farm, March 30, 1934, 1 ♀ (*J. Ogilvie*). Bechuanaland : Palapye Road, March 5, 1934, 2 ♀ (*J. Ogilvie*).

N. viridarii Ckll. is very similar, but easily separated by the sculpture of the mesonotum.

XXVII.—*Note on the Nomenclature of the Copepod Genus Megacalanus Wolfenden and allied Genera.* By G. P. FARRAN, Department of Agriculture, Fisheries Branch, Dublin.

THE identity of the large and brilliantly coloured deep-water Copepod described by Brady (1) from the 'Challenger' collections as *Calanus princeps* has been the subject of much speculation, and numerous attempts have been made to clear up its synonymy and that of allied species.

Having recently, through the good offices of Dr. P. Jespersen, had an opportunity of examining a number of specimens belonging to four of the species in question, from collections made by the 'Thor' 'Dana,' and 'Godthaab,' in the neighbourhood of Greenland and Iceland, I have reached some conclusions which differ from those which, with the support of G. O. Sars, have been generally accepted.

To put the matter briefly: Sars's descriptions and figures published in 1924-25 (9) show clearly in my opinion, that *Bathycalanus rigidus*, sp. n., Sars, is, in fact, the species described by Brady in the 'Challenger' Report as *Calanus princeps*, sp. n., and that the species which Sars described and figured as *Megacalanus princeps* Brady is a new species which has not so far received a specific name. I accordingly propose the new name

Megacalanus sarsi for this species, accepting, with some hesitation, its position in the genus *Megacalanus*.

Calanus princeps was described by Brady (1) in 1883. His brief description and few figures call attention to some characters which seem adequately to identify the species, viz., the large size, the form of the first maxilla, with much abbreviated terminal segments and absence of setæ on its first inner lobe, and the ribbon-like terminal setæ on the second maxilla. Wolfenden (18), from examination of Brady's mounted type-specimen in the British Museum, adds the following characters: "The head . . . is produced in front above the rostrum, but is without armature or spines or hairs; and the rostrum is formed by two stiff prolonged rami, without spines or filaments, and is quite different from a *Megacalanus* rostrum or head. The Anterior Footjaw has the long, ribbon-shaped, terminal bristles densely ciliated, as in Brady's drawing; the Posterior Footjaw has only very slender and short bristles, the terminal ones not ciliated, and only as long as the B2+Ri of this organ. The Re of the maxilla appear to be rather longer than the B2. The first feet have the Re of three segments, with only two Se and no trace of a hook on the B2." A recent examination of the British Museum specimen showed that Wolfenden had fallen into one slight error, possibly clerical; the terminal setæ of the posterior "footjaw" are only about half as long as the B2+Ri. It may also be added that the genital segment of the specimen, an adult female, is very much broader than the following segment.

Wolfenden in 1904 (16) described a new genus and species, *Megacalanus princeps*, differing, in his opinion, both specifically and generically from Brady's species, though approaching it in size. It seems evident to me that his opinion was correct and that the name should stand as

Megacalanus princeps Wolfenden.

G. O. Sars in 1905 (7), not having seen Wolfenden's paper of 1904, proposed a new genus, *Macrocalanus*, to contain two species from the Monaco collections, one of which, *Macrocalanus longicornis*, sp. n., was identical with Wolfenden's recently described *Megacalanus princeps*; the other species (as appears from the

figures and description which he published in 1924-5) he wrongly identified with Brady's *Calanus princeps*, and recorded as *Macrocalanus princeps* Brady. He did not specify either species as the type of the genus *Macrocalanus*. He had not, it would seem, at this date knowingly examined the true *Calanus princeps* of Brady, though it seems possible that he may by an oversight have included a specimen with his own *Macrocalanus princeps*, for With in 1915 (15) mentions that he had seen a specimen of *Calanus princeps* named correctly by Sars. It was this fact that led With to use the name *Macrocalanus* for the genus in which he placed Brady's species. In this same paper of 1905 Sars also described a third species under the name of *Bathycalanus richardi*, gen. et sp. n.

The name *Macrocalanus longicoruis* Sars, being synonymous with *Megacalanus princeps* Wolfenden, cannot stand, and the name *Macrolanus princeps* becomes a synonym of an undescribed species, possibly congeneric with *Megacalanus princeps* Wolfenden. To refer again, by anticipation, to Sars's figures of 1924 (9), it seems to me obvious, on comparing Brady's and Sars's figures, that *Bathycalanus richardi* Sars was congeneric with *Calanus princeps*, but not identical. Brady's species should accordingly become

Bathycalanus princeps (Brady).

Very shortly after Sars's paper was published Wolfenden (17 a) in the same year figured and re-described *Megacalanus princeps* and also figured and described, under the name of *Megacalanus bradyi*, a Copepod which he believed to be the same as Brady's *Calanus princeps*. By doing so he contradicted his previously expressed opinion that *Megacalanus princeps* was not congeneric with Brady's species.

This identification of *Megacalanus bradyi* with *Calanus princeps* cannot, in my opinion, be maintained, and consequently *M. bradyi* must be regarded as a valid description of a new species of the genus *Bathycalanus*, to which it clearly belongs, unless it should prove to be the same as *B. richardi*, from which it differs only in having the exopod of the first foot three-jointed in the female instead of two-jointed.

It seems to have been pointed out to Wolfenden that it was illegitimate to alter Brady's name *princeps*, for he at once withdrew his paper and circulated an amended copy (17 b) in which the names *bradyi* and *princeps* were transposed. In 1906 Wolfenden (18), after quoting the opinion of Sars, erroneously as I hold, that Brady's *Calanus princeps* was not a *Bathycalanus*, described a new species, *Bathycalanus maximus*, which, he says, is clearly not identical with Brady's *Calanus princeps*, with which he formerly identified it (*i. e.*, under the name of *Megacalanus bradyi*, altered to *M. princeps*). He then described a new genus and species, *Heterocalanus medius*, which, I am satisfied, is the true *Calanus princeps*, the genus *Heterocalanus* being synonymous with *Bathycalanus*.

In 1907 Sars (8), in a note, accepted the identity of his genus *Macrocalanus* with Wolfenden's earlier *Megacalanus*.

In 1908 (2) I used the names *Megacalanus princeps* (Brady) and *Megalcaanus longicornis* (Sars) for what I now believe to be *Bathycalanus princeps* (Brady) and *Megacalanus princeps* Wolfenden.

A. Scott in 1909 (10) recorded *Megacalanus princeps* Wolfenden and instituted a new genus, *Bradycalanus*, with a new species, *Bradycalanus typicus*, from the East Indies. He suggested that Brady's species might find a place in this new genus, but a comparison of the figures of the first maxilla of the two species is sufficient to show that this is not so. *Bradycalanus* is much more closely allied to *Megacalanus*, possibly identical, but Scott's description is not conclusive.

In 1911 Wolfenden (19), in his account of the German South Polar Expedition, recapitulated his previous descriptions of *Megacalanus princeps*, *Bathycalanus maximus*, and *Heterocalanus medius*, and recorded the capture of a specimen of Sars's *Bathycalanus richardi*, differing only from *B. maximus* in having the exopodite of the first foot two-jointed.

In 1913 Sewell (12) recorded from the Indian Ocean Wolfenden's *Megacalanus princeps* under that name, and also *Bathycalanus richardi*, the latter with almost complete fusion of the second and third joints of the exopodite of the first foot.

With in 1915 (15) recorded both *Megacalanus princeps* Wolfenden and *Macrocalanus princeps* (Brady). The latter, as his figures and description show, he correctly identified with Brady's species, reviving Sars's genus *Macrocalanus*, under a misapprehension, to contain it. This use of the generic name *Macrocalanus* cannot be accepted, as Brady's species properly belongs to the genus *Bathycalanus*. It precludes, however, any further use of the name *Macrocalanus*.

In 1924-5 Sars (9) published very complete figures and descriptions of the three species, *Megacalanus longicornis* (Sars), *Megacalanus princeps* (Brady), and *Bathycalanus richardi* Sars, which he had previously recorded in 1905, adopting Wolfenden's genus *Megacalanus* instead of *Macrocalanus*, which he had at first used. He also described as new another species of *Bathycalanus*, *B. rigidus*, which, as his figures show, was in fact identical with Brady's *Calanus princeps* and Wolfenden's *Heterocalanus medius*.

This work of Sars seems to have been accepted without question as authoritative by subsequent writers, viz., Sewell (12), Rose (6), Jespersen (4), and possibly Wilson (14), with the result that the synonymy has become somewhat involved. Wilson, however, though he figures Sars's species as *Megacalanus princeps*, refers to the thickness of the genital segment as a diagnostic character.

Assuming that my conclusions are correct, the synonymy will stand as given below. In drawing it up I have accepted as specific the difference between *Bathycalanus bradyi* and *B. richardi*, based on the jointing of the exopodite of the first foot of the female, as I have not yet seen a specimen of the latter; I have also assumed the generic distinctness of *Megacalanus* and *Bradycalanus*.

I am greatly indebted to Dr. W. T. Calman, Mr. W. H. T. Tams, and Dr. J. P. Harding for helpful advice on some of the puzzling questions of nomenclature which have arisen, though they are in no way responsible for the conclusions which have been reached. Further, thanks are due to Dr. Harding for kindly giving me facilities for examining the type-specimen of Brady's *Calanus princeps* in the British Museum.

Genus BATHYCALANUS Sars, 1905.

Bathycalanus richardi Sars.

- Bathycalanus richardi*, sp. n., Sars, 1905 (7).
Bathycalanus richardi Sars, Wolfenden, 1906 (18).
Bathycalanus richardi Sars, Wolfenden, 1911 (19).
Bathycalanus richardi Sars, Sewell, 1913 (11).
Bathycalanus richardi Sars, Sars, 1924 (9).
Bathycalanus richardi Sars, Sewell, 1929 (12).

Bathycalanus bradyi (Wolfenden).

- Megacalanus bradyi*, sp. n., Wolfenden, 1905 (17 a).
Megacalanus princeps (Brady), Wolfenden, 1905 (17 b).
Bathycalanus maximus, sp. n., Wolfenden, 1906 (18).
Bathycalanus maximus Wolfenden, Wolfenden, 1911 (19).
Bathycalanus richardi Sars, Jespersen, 1934 (4).

Bathycalanus princeps Brady.

- Calanus princeps*, sp. n., Brady, 1883 (1).
Heterocalanus medius, sp. n., Wolfenden, 1906 (18).
Megacalanus princeps (Brady), Farran, 1908 (2).
Heterocalanus medius Wolfenden, Wolfenden, 1911 (19).
Macrocalanus princeps (Brady), With, 1915 (15).
Bathycalanus rigidus, sp. n., Sars, 1924 (9).
Bathycalanus rigidus Sars, Rose, 1929 (6).
Bathycalanus rigidus Sars, Jespersen, 1934 (4).

Genus MEGACALANUS Wolfenden, 1904.

Megacalanus princeps Wolfenden.

- Megacalanus princeps*, sp. n., Wolfenden, 1904 (16).
Macrocalanus longicornis, sp. n., Sars, 1905 (7).
Megacalanus princeps Wolfenden, Wolfenden, 1905 (17 a).
Megacalanus bradyi, nom. nov., Wolfenden, 1905 (17 b).
Megacalanus longicornis (Sars), Van Breemen, 1908 (13).
Megacalanus longicornis (Sars), Farran, 1908 (2).
Megacalanus princeps Wolfenden, Scott, 1909 (10).
Megacalanus princeps Wolfenden, Wolfenden, 1911 (19).
Megacalanus princeps Wolfenden, Sewell, 1913 (11).
Megacalanus princeps Wolfenden, With, 1915 (15).
Megacalanus princeps Wolfenden, Lysholm & Nordgaard, 1921 (5).
Megacalanus longicornis (Sars), Sars, 1924 (9).
Megacalanus princeps Wolfenden, Farran, 1926 (3).
Megacalanus longicornis (Sars), Sewell, 1929 (12).
Megacalanus longicornis (Sars), Rose, 1929 (6).
Megacalanus longicornis (Sars), Jespersen, 1934 (4).

Megacalanus sarsi, sp. n.

- Macrocalanus princeps* (Brady), Sars, 1905 (7).
Megacalanus princeps (Brady), Sars, 1924 (9).
? *Megacalanus princeps* (Brady), Wilson, 1932 (14).
Megacalanus princeps (Brady), Jespersen, 1934 (4).

Genus BRADYCALANUS Scott, 1909.

Bradycalanus typicus Scott.

- Bradycalanus typicus*, sp. n., Scott, 1909 (10).

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XXVIII.—Beiträge zur Kenntnis der Conopiden.—I.

Von O. KRÖBER, Hamburg.

Da ich Gelegenheit hatte, die Typen des British Museum zu sehen, habe ich das gesamte mir vorliegende Conopidenmaterial einer neuen Durchsicht unterzogen. Besonders reiches Material des British Museum aus Afrika, Indien und Australien hat zur Aufstellung einer Anzahl neuer Arten und Gattungen geführt, die ich nach Faunen abhandeln werde. Nachstehend gebe ich eine neue Bestimmungstabelle der Unterfamilien und Gattungen.

- | | |
|---|--------------------------------------|
| 1. Drittes Fühlerglied mit Endgriffel | I. Unterfamilie |
| Drittes Fühlerglied mit Rückenborste | 2. [CONOPINÆ. |
| 2. Untergesicht stark gekielt, ohne Gruben.
Rüssel sehr auffallend lang und dünn.
Lippen sehr lang, fadenförmig, oft nach
aussen umgerollt. Fühlerborste deutlich
dreigliedrig. Körper sehr zart und
schlank. Weibchen mit langer, vorste-
hender Legeröhre | [STYLOGASTERINÆ.
II. Unterfamilie |
| (Nur eine Gattung: <i>Stylogaster</i> Macq. (Asien, Australien,
Afrika, Amerika).) | |
| Untergesicht nie gekielt. Rüssel nie auffal-
lend dünn und fädlich, oft aber kurz, fast
in der Mundhöhle verborgen. Fühler-
borste zweigliedrig | 3. |
| 3. Weibchen mit am Bauche eingeschlagener
Legeröhre. Männchen mit fadenförmigem
Anhang am Penis. Körper im männ-
lichen Geschlecht, von oben gesehen, oft
kreisrund | [DALMANNINÆ.
III. Unterfamilie |
| Weibchen mit unpaarem Organ (Theka).
Männchen ohne fadenförmigen Anhang.
Körper stets walzig, länglich | [MYOPINÆ.
IV. Unterfamilie |

I. Unterfamilie CONOPINÆ.

- | | |
|---|--------------------------------------|
| 1. Untergesicht ohne Gruben | i. Gruppe und Gattung |
| TRÖPIDOMYIA Will. (Amerika, O.-Indien, Paläarkt.). | 2. |
| Untergesicht mit Gruben | |
| 2. Fühler kaum kopflang mit rundlichem
Endglied. Kopf rundlich, aufgeblasen.
Vertexkissen nimmt nur die Mitte des
Scheitels ein | [CERÆA v. Röd.
ii. Gruppe BRACHY- |
| Fühler mindestens kopflang, mit spatel-
förmigem Endglied | 3. |
| 3. Fühlerglied stets das längste | iii. Gruppe MICRO- |
| 3. Fühlerglied nie das längste | 4. [CONOPS Krb. |
| 4. 2. und 3. Abdominalsegment etwa gleich
lang und gleich stark. Erste Hinterrand-
zelle meistens sehr lang und spitz. Kleine
Querader etwa auf der Mitte der Discal-
zelle stehend | iv. Gruppe CONOPS L. |

2. Abdominalsegment bedeutend länger als das 3. Segment. Erste Hinterrandzelle meistens kurz. Kleine Querader im zweiten Drittel der Discalzelle stehend ..

[CEPHALA Schin.
v. Gruppe PHYSO-

Gruppe MICROCONOPS.

1. Rüssel 2-2½ mal so lang wie der Kopf. 2.
Rüssel ca. 1½ mal kopflang oder in der
Mundhöhle verborgen
2. Kopf mit lang vorgestrecktem Fühler-
höcker
3. Kopf rundlich gebaut
3. Schildchen und Thorax stark behaart. 3.
Fühlerglied 3 mal so lang wie das 2.
oder 1.
Schildchen und Thorax kaum behaart, ohne
Macrochaeten
4. 3. Fühlerglied dreimal so lang wie das 1.
oder 2.: Griffel 2gliedrig
3. Fühlerglied doppelt so lang wie das 1.
oder 2.; Griffel dreigliedrig
5. Rüssel fleischig, kopflang
- Rüssel chitinos, 1½ mal kopflang
6. 1. Hinterrandzelle kurz wie bei *Physoce-
phala* aber langgestielt. Hinterleib
parallelrandig. Endgriffel 2gliedrig ...
1. Hinterrandzelle lang wie bei *Conops*,
mässig lang gestielt
7. Augenrand der Stirn mit Schwiele. End-
griffel 2gliedrig
- Augenrand ohne Schwiele. Endgriffel
3gliedrig
8. Körper mit metallisch stahlblauen Partien.
3. Fühlerglied 3mal so lang wie das 1.
oder 2.
Körper ohne metallisch stahlblaue Partien.
9. 1. Hinterrandzelle wie bei *Heteroconops* mit
sehr langem Stiel
1. Hinterrandzelle wie bei *Conops*, mässig
lang gestielt
10. Grosse, plumpe Arten von 9-5-14 mm. mit
grösstenteils rotgelbem Körper
- Kleine Arten von höchstens 9 mm., die im-
mer schwarz gefärbt sind
11. Stirn und Scheitel am Augenrand bis eben
unterhalb der Fühler mit einer schwarz-
glänzenden Schwiele
- Stirn und Scheitel ohne Schwiele am
Augenrand
12. Endgriffel 2gliedrig. 3. Fühlerglied 1½ mal
länger als das 1. und 2. zusammen
- Endgriffel 3gliedrig. 3. Fühlerglied ca.
1½ mal länger als das 1. oder 2.

[nov. (Austral.).
Stenoconops, gen.
3.
[(Australien).
Neoconops Krb.
4.
[(Australien).
Paraconops Krb.
[(Südamerika).
Aconops Krb.
6.
8.
[(Australien).
Heteroconops Krb.
7.
[nov. (Australien).
Delkeskampomyia, gen.
[(Klein Asien).
Neobrachyglossum Krb.
[(Afrika).
Eucoconops Krb.
9.
[(Australien).
Smartiomysia, gen. nov.
10.
[nov. (Australien).
Chrysidomyia, gen.
11.
[(Australien).
Callosiconops, gen. nov.
12.
[(Indien, Afrika).
Pleurocerinella Brun.
[(Australien).
Microconops Krb.

Gruppe BRACHYCEERÆ.

1. 3. Fühlerglied deutlich länger als das 2.
Art von 5 mm.
2. und 3. Fühlerglied gleich lang. Arten
von 10-12.5 mm.

[gen. nov.
Microbrachyceræa,
2.

2. Punktaugen auf einem kleinen Fleck an der Spitze des Vertexkissens. Stirn oben von doppelter Augenbreite [(Paläarkt.).
Brachyceræa v. Röd.
 Punktaugen fehlen; statt dessen ein tiefes Grübchen im Ozellenhöcker. Stirn nicht breiter als ein Auge [(Paläarkt.).
Neobrachyceræa Szil.

Gruppe CONOPS.

1. Vertexkissen vorn 3lappig mit deutlichem Ozellenhöcker. Hinterleib wie bei *Physocephala*, aber 2. und 3. Ring gleich lang. Vertexkissen vorn flach konvex [(Afrika).
Cænoconops, gen. nov.
 2. Analsegment des Weibchens abgespreizt wie bei *Sicus*, ohne Theka [(Afrika).
Anticonops Krb.
 3. Analsegment quer zur Längsachse des Körpers [Erdteile).
Conops L. (alle
 4. Analsegment in die Längsachse gelagert... [Afrika).
Archiconops, gen. nov.
 3. Griffelglied blattförmig, kompress. 2. [Asien).
 Fühlerglied sitzt dorsalwärts auf dem 1.. *Macroconops* Krb.

Gruppe PHYSOCEPHALA.

1. Vertexkissen mit deutlichem Ozellenhöcker [(rika, Afrika, Asien).
Physoconops Szil. (Ame-
 Vertexkissen ohne jede Spur von Ozellenhöcker 2.
 2. Kurze, gedrungene Arten mit löffelförmiger Schuppe am Bauch *Dacops* Speis. (Afrika).
 Körper ohne solchen Bauchanhang 3.
 3. Kurze, gedrungene Arten mit grossem, flachem Kopf und mit lackartig glänzendem Einschnitt am Hinterrand des Auges *Pseudophysocephala*,
 [gen. nov. (Afrika, Indien).
 Langgestreckte, meist schlanke Arten mit + halbkugeligem Kopf ohne Keifleck am Hinterrand des Auges 4. [(alle Erdteile).
Physocephala Schin.
 4. Analsegment quer zur Körperachse gestellt. [gen. nov. (Afrika).
 Analsegment in die Längsachse des Körpers gelagert *Archiphsysocephala*,

III. Unterfamilie DALMANIINÆ.

1. Analzelle auffallend kurz, langgestielt; meist kugelige Arten [(Amerika, Europa).
Dalmannia Rob.-Desv.
 Analzelle fast bis zum Rande reichend.... 2. [(Afrika).
 2. *Myopa*-artige, pelzig behaarte Arten *Paramyopa* Krb.
Zodion-artige Tiere mit senkrecht gespaltenem Analsegment des Männchens [(Südamerika).
Parazodion Krb.

IV. Unterfamilie MYOPINÆ.

1. Rüssel nur an der Basis gekniet 2.
 Rüssel an Basis und Mitte gekniet 3.
 2. 2.-4. Abdominalsegment vollkommen verschmolzen. [(Südamerika).
Neozodion Szil.
 2.-4. Segment deutlich getrennt *Zodion* Latr. (Europa,
 [Asien, Amerika, Afrika).

3. Untergesicht stark verlängert 4.
 Untergesicht mässig verlängert..... 5.
 4. Abdomen kürzer als die Flügel, oben platt.
 Mund vorgezogen *Myopa* F. (Europa,
 [Australien, Afrika, Nordamerika).
 Abdomen lang, walzig. Mund abgerundet
 (*carbonaria* Krb. nicht!) *Melanosoma* Rob.-
 [Desv. (Europa, Asien, Afrika (?), Amerika.
 5. Fühler länger als ihr Abstand vom Scheitel *Oecemyia* Rob.-Desv.
 [(Europa, Asien, Afrika, Nordamerika).
 Fühler kürzer als ihr Abstand vom Scheitel. *Sicus* Scop. (Europa,
 [Asien, Nordamerika).

I. PALÆARKTISCHE REGION.

Da ich erst 1936 in den Acta Inst. et Musei Zoologici Univ. Atheniensis, vol. 1 über diese Zone gearbeitet habe, so kann ich bei den meisten Arten nur neue Fundorte angeben, die aber z. T. sehr interessante Aufschlüsse über die Verbreitung der einzelnen Arten geben.

Brachyglossum coronatum Rond., liegt vor von Algier.

Physocephala nigra Deg., von Böhmen.

Physocephala rufipes F., von Schwalbach; Lettland; Polen; Savoyen.

Physocephala rufipes F. var., von Spanien, Sierra da Guadarama viii. Das 2. Abdominaltergit ist ganz schwarz, bis auf einen kleinen Mittelfleck dicht goldgelb tomentiert.

Physocephala pusilla Mg., von Mazedonien, Beshik Distr., 22. 5.; Valencia; Fergana.

Physocephala vittata F., von Mazedonien, Beshik Distr.; Cypern—Limassol, Cherkas Kambos; Taygetos; Croatien; Herzegowina; Samarkand.

Physocephala vittata F. var. *abdominalis* Krb., von Jerusalem; Cypern, Akroteri Forest.

Physocephala vittata F. var. *immaculata* n. var., von Cypern, Yamagusta, 13. 3., M. Ktisma 3. 5.—15. 7, Limassol 1.7.

♂ Länge 11.5–12.8 mm., ♀ 14–14.5 mm. Flügellänge, ♂ 7, ♀ 8 mm., -breite ♂ 1.6—fast 2 mm., ♀ 2.2 mm.

Abdomen des ♂ ganz einheitlich rotbraun, 1 ♂ hat am Schildchen jederseits einen schwarzen Fleck. ♀ sehr blass gelbbraun, vielleicht eine Folge der Konservierung. Thorax mit 3 deutlichen schwarzen Längstriemen. Hinterrücken unten schwarzbraun, desgleichen alle Hüften.

Tarsen gegen das Ende zu braun verdunkelt. Hinterrand des 3. und 4. Tergits braun, desgleichen die Spitze der Theka und des Abdomens.

Physocephala biguttata v. Röd., von Teneriffa.

Physocephala chrysorrhæa, Mg., von Algier, Biskra; Frankreich; Königswusterhausen.

Physocephala chrysorrhæa Mg. var. *maculigera* Krb., von Biskra; Suez.

Physocephala vaginalis Krb., von Spanien, Murcia, 6. 6.

Physocephala antiqua Wied., von Kl. Asien, Manisa, Kassaba; Algier, Mt. Ben Omar.

Physocephala furax Beck., von Arabien, Lahej-Aden; Mesopotamien, Amara a. Tigris 1. 6.

Neobrachyceræa obscuripennis var. *nigrita* Krb., von Johore.

Conops superbus v. Röd., von Cypern, Limassol.

Conops elegans var. *fuscipennis* Macq., von Cypern, Akroteri Bay, Limassol.

Conops elegans var. *minutus* Krb., von Cypern, Limassol.

Conops tomentosus var. *immaculatus* Krb., von Amara a. Tigris, 14. 6.

Conops kröberi Param., von Arabien, Lahej, 6. 3.–23. 3.

Conops strigatus Wied., von Schandau.

Conops scutellatus Meig., von Südtirol.

Conops flavipes L., von England; Morea, Mt. Chelmos, 15. 8; Ussuri.

Conops quadrifasciata Deg., von Abazzia; Schweiz; Savoyen.

Zu der Gruppe *rufiventris* würden 2 Arten von Japan zu stellen sein, die vielleicht mit Arten von Mats. zusammenfallen, deren Beschreibungen ich nirgends erhalten kann.

Conops flavonervosus, sp. n., ♀, von Japan. Type: London.

Länge 11.5 mm. Fühler 4 mm.; Flügellänge 9 mm., -breite 3 mm.

Ähnlichkeit mit *fulvicornis*. Kopf rotgelb mit sametschwarzen Makeln. Fühler hellrotgelb. 1. Glied ca. 5

mal so lang wie breit, 2. ca. 2 mal so lang wie das 1.; 3.=dem 1. Endgriffel 3gliedrig, ohne Seitenfortsatz. Rüssel dünn, über 2 mal kopflang, die Mittelpartie rotbraun. Untergesicht rotgelb, goldgelb tomentiert. Stirn rotbraun, gefurcht. Scheitel blasser. Kein Ozellenhöcker. die Hufeisenzeichnung ist kaum angedeutet. Gruben unten schwärzlich. Kiel gelb. Hinterkopf gelbbraun, etwas weiss schimmernd. Thorax gelbrot, mit 3 zusammenge flossenen schwarzen Striemen. Der ganze Seitenrand, die Beulen, Schildchen gelbbraun. Hinterrücken nebst Pleuren schwarz, ganz zart gelb bereift. Schwinger und *p* dunkelrotgelb f_{2+3} etwas verdunkelt in den Basalpartien. Tarsen braun, Haftläppchen und Klauen bräunlich. Flügel bleichbraun tingiert, die Binde liegt zwischen der 2. und 3. Ader und der *vena spuria*. Alle Adern gelb. Abdomen rotbraun mit gelblichem Ton. Alle Segmentmitten bis zu Schwarz verdunkelt. 1. Tergit nur mit rotgelbem Saum, sonst schwarz. Analsegment und Genitalien ganz rotgelb. Theka gross, dornförmig, schwarz. Toment vom 4. Ring ab etwas gelblich.

Conops japonicus, sp. n. ♀, von Yokohama. Type: London.

Länge 16 mm. Fühler 4 mm.; Flügellänge 12 mm., -breite 4 mm.

Grosse, plump gebaute Art ohne Sammetmakeln der Stirn. Kopf rotgelb bis rotbraun, goldschimmernd. Stirn nur mit einigen leicht angedeuteten Furchen. Kein Ozellenhöcker. Hufeisenzeichnung kaum angedeutet. Kiel ganz unten mit kleinem schwarzem Fleck. Rüssel ziemlich stark, rotbraun, ca. $1\frac{1}{2}$ mal kopflang (weshalb die Art vielleicht in die Gruppe *vesicularis* gestellt werden könnte). Fühler düster rotbraun. 1. Glied ca. 5 mal so lang wie breit; 2. kaum doppelt so lang wie das 1.; 3.=1. Endgriffel 3gliedrig, Seitenfortsatz kaum vorhanden. Hinterkopf rotbraun, goldgelb tomentiert. Auf der Scheitelblase 2 gelbe Tomentfleckchen. Thorax schwarz, Beulen und Schildchenrand rotbraun. Hinterrücken schwarz, Seitenplatten gelbtomentiert. Pleuren schwarz. Schüppchen, Schwinger, *p* rotgelb, nur die Tarsen schwarzbraun, breit. Haftläppchen und Klauen weissgelb. Toment silbern. Abdomen schwarz, alle Ringe mit

goldgelbem Hinterrandsaum. 2., 3., 4., 6. und 7. $\pm$ seitlich rotbraun. Theka gross dornförmig, schwarz. Flügel zart gelbbraun tingiert ohne Binde, nur die Spitzenpartie erscheint zwischen r_{2+3} dunkler. Alle Adern gelb.

OCCEMYIA Rob.-Desv.

Bestimmungstabelle für die Occeomyia-Arten.

Weibchen.

- | | |
|--|--|
| 1. 2. und 3. Fühlerglied nahezu gleichlang.
Theka rundlich, oft tütenförmig | 2. |
| 2. Glied bedeutend länger als das 3. Theka
lang dornförmig, in Seitenansicht dreieckig | 5. |
| 2. Theka kürzer als breit, meistens verborgen,
nicht abstehend. Abdomen vorherrschend
graugelb bestäubt. 6. Tergit oben stark
tomentiert | 3. |
| Theka gross und löffelförmig, deutlich sicht-
bar. Abdomen vorherrschend glänzend
schwarz, mit schmalen, silberglänzenden
Hinterrandhinden. 6. Tergit glänzend
schwarz. Thorax, wenn gestriemt, mit 3
Striemen, also einer mittleren | 4. |
| 3. Thorax matt gelbgrau bestäubt mit 2 deut-
lichen glänzend schwarzen Mittelstriemen
bis zur Quernaht und je einer seitlichen
Fleckenstrieme. 6. Tergit oben bestäubt;
nur das Analsegment glänzend schwarz. p
fast gelbbraun. Abdomen matt gelblich
tomentiert. Behaarung lang abstehend,
ziemlich dicht, weiss oder schwarz. Schei-
tel und Stirn ganz rotgelb oder oben bis
rotbraun verdunkelt. 6-7.5 mm. | <i>O. distincta</i> Meig. |
| Thorax mit kaum erkennbarer Striemung:
2 Mittelstriemen und je einer seitlichen
Fleckenstrieme. p schwarz mit gelben
Gelenken (wenn unreif: f_3 an der Basis
hell!) Abdomen ganz leicht gelblich tomen-
tiert, oft auf Hinterrandsäume beschränkt.
6. Tergit oben fast ganz tomentiert. Be-
haarung mässig lang und dicht, schwarz.
Stirn und Scheitel ganz hellrotgelb oder
nach oben rotbraun verdunkelt. 4-4.5 mm. | <i>O. melanopa</i> Rond.
[(nach Becker Varietät von <i>distincta</i> !).] |
| 4. p vorherrschend schwarz. f_{1+3} lang und dicht
behaart. f_3 mit scharf begrenzter heller
Basis. Theka kreisförmig, so lang wie
breit. Sternitränder vom 3. und 4.
Sternit schwarz. Stirn hell rotgelb,
Scheitel schwarz | <i>O. pusilla</i> Meig. |
| p vorherrschend oder ganz hellgelbbraun.
f_3 mit schwarzem Spitzendrittel. Theka
gross, tütenförmig, länger als breit. Sternit-
ränder vom 3. und 4. Ring hellgelbbraun.
Stirn und Scheitel dunkel. (Formosa.) .. | <i>O. caenovalva</i> Krb. |
| 5. Thorax mit 3 deutlichen schwarzglänzenden | |

Striemen auf gelbgrauem Toment. Abdomen seidig gelb grau tomentiert, nur am 6. und 7. Ring glänzend schwarz. *p* hell gelbbraun. Stirn rotgelb bis rotbraun, oben dunkler. 7–8 mm.

O. sundewalli Zett.

Thorax mit 3 $\pm$ undeutlichen Striemen auf weissgrauem Grund. Abdomen manchmal weissgrau bestäubt, stets mit $\pm$ deutlichen Silberbinden am Hinterrand. *f*₁ schwarz, *f*₃ oder *f*₂₊₃ schwarz mit heller Basis. *t*_{1–3} schwarzbraun. Stirn oben nebst dem Scheitel schwarz. 6–7 mm.

O. atra F.

Davon unterscheidet sich *O. sauteri* Krb. von Formosa hauptsächlich durch folgendes: Schillerbinden des Abdomen mehr gelblich. *p* gelbbraun, *f*_{1–3} mitschwarzer Makel oben an der Spitze. Scheitel und obere Stirnpartie schwarz.

Männchen.

1. 2. und 3. Fühlerglied ganz oder fast gleich lang. 2.
2. Glied bedeutend länger als das 3. 4.

2. Thorax und Abdomen fast glanzlos gelbgrau tomentiert. Thorax 2 striernig und mit je einer seitlichen Fleckenstrieme. Bei Betrachtung von der Seite sind die Tergite stets ohne Silberbinde am Hinterrand 3.

Thorax ohne deutliche Striemung, manchmal tritt eine Mittelstrieme auf. Thorax manchmal etwas weissbereift, meistens aber $\pm$ schwarzglänzend. Abdomen, seitlich betrachtet, stets mit Silberstriemen an den Hinterrändern der Tergite; von oben gesehen, oft weissgrau tomentiert

O. pusilla Meig.

3. Grosse Art von 6–7 mm. Thorax gelbgrau tomentiert mit 2 Mittelstriemen und je einer seitlichen Fleckenstrieme. Abdomen vollkommen seidig gelbgrau tomentiert, weiss oder schwarz behaart. *p* ganz gelbbraun mit schwarzen Tarsen, event. *f*₁ unten mit rotgelbem Fleck, *f*₃ mit rotgelber Basalhälfte. *t*₃ mit rotgelbem Basaldrittel. Stirn und Scheitel rotgelb.

O. distincta Meig.

Kleine Art von 3–5 mm. Thorax mit 2 undeutlichen Mittel- und 2 Seitenstriemen. 1.–3. Tergit manchmal in der Mitte glanzlos schwarz. *f* schwarz, Gelenke und *t*-basen gelbbraun. Stirn und Scheitel rotgelb

O. melanopa Rond.

4. Abdomen gelbgrau tomentiert, bei Betrachtung von der Seite stets ohne Silberbinden am Hinterrand. Thorax gelbgrau. mit 3 schwarzglänzenden deutlichen Striemen. *p* gelbbraun, *f*₁₊₂ oben $\pm$ schwärzlich; *t* mit schwärzlichen Spitzen. Stirn rotgelb, Scheitel rotbraun

O. sundewalli Zett.

Abdomen (auch wenn weissgrau tomentiert)

bei Seitenbetrachtung mit Silberschiller
an den Hinterrändern der ersten Ringe.
f braun bis schwarz *f*₃-basis zu 2/3 gelb-

braun *O. atra* F.

(*sauteri* Krb. hat gelbgrau schillernde Binden. *p* gelbbraun,
nur die Spitze von *f*₁₋₃ oben mit schwärzlicher Makel.)

Occemyia atra F., liegt vor von den Pyrenäen; von
Cypern, Limassol, Cherkas; Tientsin; Corsica;
Bosien; Jekatarinoslaw.

Occemyia pusilla Mg., von Mazedonien, Struma, Kalamaria;
Cypern, Limassol; San Marino; Bulgarien.

Occemyia sundewalli Zett., von Lettland; Croatien.

Sicus ferrugineus L., von England; Polen; Dalmatien;
Rumänien; Savoyen; China.

Sicus ferrugineus L. var. *nigricans* n. var. ♂, von Sutschan,
Ussuri.

Gleicht in allem der Stammform, aber Stirn und
Scheitel sind rotgelb, nicht nach oben verdunkelt. Scheitel
vor dem Ozellenfleck mit zwei nebeneinander liegenden
rotbraunen Querflecken. Untergesicht rotgelb. Backen
gelbschimmernd. Fühler hell rotbraun, Borste schwarz.
Rüssel schwarz. Hinterkopf dunkelrotbraun mit 2
schwarzen Längsstrichen. Thoraxplatte oben schwarz,
sonst dunkelrotbraun. Pleuren und Hüften mit schwar-
zen Flecken. *p* rotbraun, *f* mit unbestimmter schwarzer
Fleckung. Hinterleib dunkelrotbraun, oben grösstenteils
schwarz, die rotbraunen Seitenpartien lebhaft weiss
schimmernd. 2. Tergit breiter als lang.—Type: Berlin.

Melanosoma pallipes Wied., von Frankfurt a. Oder.

Melanosoma bicolor Mg., von Euböa, Chalcis; Messina.

Melanosoma carbonaria Krb., von Turkestan.

Myopa buccata L., Dardanellen; Croatien, Riviera di
Levante; Saragossa; Fergana, Russland; Lappland;
Lettland.

Myopa picta Panz., vom Banat.

Myopa testacea L., von Cypern; Portugal; Spanien;
Frankreich, Banat, Croatien, Riviera di Levante;
Lettland.

Myopa testacea var. *stigma* Mg., von Mentone.

Myopa fasciata Mg., vom Baikalsee, viii.; Bosnien.

Myopa minor Strobl, von Tunis.

Myopa morio Mg., vom Banat.

Zodion erythrurum Rond., von S. Frankreich, Digne.

Zodion cinereum F., von Morea, Kambos, Taygetos ;
Montenegro ; Italien ; Lettland.

Zodion notatum Mg., von Oesterreich.

An dieser Stelle möchte ich darauf hinweisen, dass von den Beckerschen Conopidentypen nur die folgenden im Berliner Museum vorhanden sind : *Conops sareptanus* ♂ (Gruppe *scutellatus*), *C. læta* ♀ (Gruppe *insignis*), *Physocephala persica* ♂ (Rest von Thorax, Abdomen und einem Flügel ; ist von mir richtig gedeutet gewesen), *P. furax* (Gruppe *chrysorrhæa*) ; *Dalmannia confusa* (ist wirklich ein ♂ !) *Myopa dorsalis* var. *nigrifacies* (nur Thoraxrest mit beiden Flügeln vorhanden. Diese sind gleichmässig braun tingiert, am Vorderrand etwas dunkler), *Melanosoma horrida* ♀ (ist *rubripes* Villen.), *Zodion asiaticum* Beck., ♂.

Die Type von *Myopa albovillosa* v. Ros. lag mir vor. Es ist ein ♂ von *Dalmannia marginata* Meig.

Drei nov. spec. in den Beiträgen zur Fauna Thüringens, iii. Diptera von Gustav Jänner, 1937, habe ich trotz aller Bemühungen nicht einsehen können. Ich habe auch nicht erfahren, ob sie schon beschrieben wurden. Ich fasse sie daher als nom. nud auf. Es sind *Physocephala picipes*, *Myopa inamis* und *M. pacitica*, alle ohne Autor aufgeführt.

II. DIE CONOPIDEN DER ÆTHIOPISCHEN REGION.

Das reichhaltige Material, das mir von dieser Fauna zugegangen ist, zwingt mich, eine neue Übersicht über die Gattungen und Arten zu geben. Ein ♀ von *Myopa æstracea* Lw. beweist, dass diese Art in meine Gattung *Paramyopa* gehört, also mit *P. insignis* Jänn. im Besitz einer Legeröhre ist. Als ♂ wird zu *P. æstracea* die *P. schulzei* Bzzi. gehören, die sich nur durch die Farbe des 3. Fühlergliedes unterscheidet. *Myopa* kommt also im äthiopischen Faunengebiet nicht vor. Die ♂♂ von *Paramyopa* wären auf das einfachste von *Myopa*-♂♂ durch die schwarzen Haarbürsten auf dem Schildchen zu unterscheiden.

Da Szilady auf Grund des Ozellenhöckers seine Gattung *Physoconops* aufstellt, so muss die *Physocephala tuber-*

culata Brun. in diese Gattung gestellt werden. Dann muss aber auf jeden Fall für *Conops rhodesiensis* Brun. ein neues Genus geschaffen werden. Für *Conops* gibt Szil. das gleichmässig schwach konvex begrenzte Vertexkissen an. *C. rhodesiensis* aber hat ein Vertexkissen, das vorn dreimal tief ausgebuchtet ist und dessen Mittelstück ein $\pm$ deutliches Ozellenhöckerchen trägt, eine Bildung, die ich bei keiner andern Form wiedergesehen habe. Ich nenne diese Gattung *Cænoconops*, n. gen.

Von *Physocephala* Schin. lässt sich die *platycephala*—Gruppe durch den kurzen, gedrungenen Körperbau, verbunden mit dem grossen, auffallend flachen Kopf, dessen Augen am Hinterrand ein auffälliges Keilchen tragen, das glänzend, wie lackiert erscheint, trennen. Ich wähle dafür den Namen *Pseudophysocephala*, n. gen.

Von allen echten Conopinæ sind bisher 4 Arten durch ein gemeinsames Merkmal abweichend: bei ihnen liegt nämlich das Analsegment, das stets quer, also rechtwinklig zur Längsachse des Körpers gelagert ist, in der Richtung der Längsachse. *Macroconops helleri* Krb. aus der orientalischen Region ist deshalb schon abgesondert (hat auch ganz apart gebildete Fühler!). In der äthiopischen Fauna tritt diese Bildung bei *Physocephala gigantea* Krb. auf, die ich als *Archiphysocephala*, n. gen. absondere, und bei 2 *Conops*-Arten: *insularis* Krb. von St. Thomé und *nigra*, sp. n., von Madagascar, die ich als *Archiconops*, n. gen. zusammenfasse. Ich glaube in dieser absonderlichen Form des ♂-Abdomens ein generisch wertvolles Merkmal sehen zu dürfen, zu dem ein entsprechend geformtes ♀-Abdomen gehören wird.

Die Übersicht der äthiopischen Gattungen würde sich also wie folgt gestalten:—

- | | |
|---|-----------------|
| 1. 3. Fühlerglied mit einem Endgriffel | CONOPINÆ. |
| 3. Fühlerglied mit einer Rückenborste . . | 2. |
| 2. Untergesicht lang gekielt, ohne Gruben.
Rüssel sehr lang, auffallend dünn, Lippen
sehr lang, fadenförmig, oft nach aussen
aufgerollt. Fühlerborste deutlich drei-
gliedrig. Körper sehr zart und schlank.
♀ mit lang vorstehender Legeröhre. (Nur
1 Gattung: <i>Stylogaster</i> Macq.) | STYLOGASTERINÆ. |
| Untergesicht nie gekielt. Rüssel nie auffal-
lend lang und dünn, aber oft kurz, fast in
der Mundhöhle verborgen. Fühlerborste
zweigliedrig | 3. |

3. ♀ mit am Bauch eingeschlagener Legeröhre.
 ♂ mit fadenförmigem Anhang am Penis.
 (Nur 1 Gattung: *Paramyopa* Krb.) DALMANIINÆ.
 ♀ mit unpaarem Organ (Theka); ♂ ohne
 fadenförmigen Anhang (2 Gattungen) .. MYOPINÆ.

MYOPINÆ.

1. Rüssel nur an der Basis gekniet *Zodion* Latr.
 Rüssel an der Basis und in der Mitte gekniet. Fühler meistens kopflang. Kleine graue oder schwarze Arten *Occemyia* Rob.-Desv.

CONOPINÆ.

1. Untergesicht scharf gekielt, ohne Gruben.
 Hinterleib wie bei *Physocephala*. 1. Hinterrandzelle wie bei *Conops* *Tropidomyia* Will.
 Untergesicht mit Gruben, die durch einen flachen Kiel getrennt sind 2.
 2. 3. Fühlerglied bei weitem das längste 3.
 3. Fühlerglied nie das längste 4.
 3. Körper mit stahlblauen, metallischen Partien oder vorwiegend stahlblau. 3. Fühlerglied 3mal so lang wie das 1. oder 2. *Euconops* Krb.
 Körper nie metallisch glänzend. Hinterleib wie bei *Physocephala*: 2. und 3. Ring gleich lang. 1. Hinterrandzelle wie bei *Conops* *Pleurocerinella* Brun.
 4. 2. und 3. Abdominalsegment nahezu gleich lang und gleich stark 5.
 2. Ring bedeutend länger als der 3. Abdomen wespenförmig gestielt 8.
 5. Vertexkissen vorn 3mal tief ausgebuchtet; die mittlere Bucht trägt einen deutlichen Ozellenhöcker. Hinterleib wie bei *Physocephala* aber 2. und 3. Ring gleich lang. 1. Hinterrandzelle wie bei *Conops* *Cænoconops*, gen. n.
 Vertexkissen vorn flach convex begrenzt ohne Andeutung eines Ozellenhöckers... 6.
 6. Analsegment des ♀ abgespreizt wie bei *Sicus*; ohne Theka. *Anticonops*, gen. n.
 Analsegment fest an das vorletzte angepresst. Theka vorhanden 7.
 7. Analsegment quer zur Längsachse des Körpers gestellt *Conops* L.
 Analsegment in die Längsachse des Körpers gelagert *Archiconops*, gen. n.
 8. Vertexkissen mit deutlichem Ozellenhöcker *Physoconops* Szil.
 Vertexkissen ohne jede Spur von Ozellenhöcker 9.
 9. Kurze, gedrungene Arten mit wagerecht vorstehendem lötfelförmigem Schüppchen an der Ventralseite (4. oder 5. Sternit). Abdomen wie bei *Physocephala*; 1. Hinterrandzelle desgleichen *Dacops* Speis.
 Körper ohne solchen Bauchanhang 10.
 10. Kurze, gedrungene Arten (mit 1 Ausnahme), mit grossem, flachem Kopf,

- dessen Augen einen deutlichen, lackartig glänzenden, keilförmigen Einschnitt am Hinterrand zeigen. Abdomen und 1. Hinterrandzelle wie bei *Physocephala* .. *Pseudophysocephala*, [gen. n.]
 Langgestreckte, schlanke Formen mit $\pm$ halbkugeligem Kopf ohne Keilfleck am Augenrand 11.
 11. Analsegment quer zur Längsachse des Körpers gestellt *Physocephala* Schin.
 Analsegment in die Längsachse des Körpers gelagert [gen. n.] *Archiphysocephala*,

Paramyopa schulzei Bzzi., ♀, von Worcester, Cape Col. ix. ist neu.

Länge 11.1 mm.

Gleicht in allem dem ♂. Ozellarfleck auf einem spiegelblanken durchsichtigen Schild gelegen. 3. Fühlerglied schwarz. Thorax vorherrschend kurz schwarzhaarig. Bezzi sagt, das Schildchen ist zweilappig. Das stimmt nicht, sondern es trägt jederseits eine Bürste schwarzer Haare, wodurch die Mitte vertieft erscheint. Schüppchen schneeweiss, so behaart. 2. und 3. Flügelader stark nach dem Vorderrand zu gebogen. Die Genitalien bilden eine ziemlich lange klauenartig spitz endende Legeröhre, deren Spitzenpartie glänzend gelbbraun ist, die Basalpartie schwarz, der Beginn des Endsegments rostrot. Taster schwarz. Stirnbehaarung schwarz. Schildchen mit 6 langen gelbbraunen Randborsten. *f* mit je 2 schwarzen Flecken, *t* desgleichen, Knie weisslich. In der ersten Basalzelle liegt nahe der Basis ein schwarzer Keilfleck. Adern schwarz, teilweise rotbraun.

Wenn die Verbrechung der 2. Flügelader abnorm ist, so ist sie syn. zu *P. aëstracea* Lw.

OCEMYIA Rob.-Desv.

1. Fühler schwarz. Kleine Art von 3–4.5 mm. Gleich *O. pusilla*, aber mit absolut hyalinen Flügeln *O. hyalipennis* Krb.
 Fühler ganz oder fast ganz hellrotgelb 2.
2. Hinterleib seitlich kastanienbraun. (Wenn nicht ein Zeichen der Unreife!) 4 mm. *O. africana* Brun.
 Hinterleib ganz tiefschwarz 3.
3. Theka unten rotgelb. Fühler hellrotgelb, Spitze des 3. Gliedes verdunkelt. Vorderhüften rotgelb. Körperbehaarung wenig auffällig und lang *O. flavicornis* Krb.
 Theka ganz schwarz. Fühler gelbbraun bis tiefschwarz, entschieden kürzer als bei *flavicornis* und robuster. Körperbehaarung lang

und stark, auffällig, namentlich am Thorax
vor dem Schildchen und am Abdomen.

Hüften rotgelb *O. pilosa* Krb.

Es liegen vor :

Occemyia pilosa Krb., von Uganda, Juratong Mts., ii., 1 ♂.

Occemyia flavicornis Krb. Cape Col., Mosselbay, 5. 7.–31. 7.
Uganda, Budongo Forest, 11. 12.–15. 12. Kilembe
xii.

Occemyia africana Brun., Uganda, Kilembe, xii. 1 ♂,
vielleicht auch 1 Ex. von Magadascar, Majunga, i.–ii.,
bei dem die Fühlerborste hell zu sein scheint.

Fig. 1.



Occemyia africana Brun., ♂. Fühler.

Stylogaster leonum Westw., von Lagos, Yabe, 20. 9, Ashanti,
Obuasi, 21. 7.–23. 8. Kenya, Kilihi, 22. x.

Stylogaster nitens Brun. (?), Cape Pr., Mossel Bay, 18.–30. xi.

Stylogaster nitidula Krb. (?), N. Rhodesia, Lunda, 7. x.

Stylogaster varifrons Mall., 1 ♂, Uganda, Kampala, 27. 9.,
16. 3. 2 Ex. ohne Abdomen !

Länge 5.6 mm. Fühler 0.3 mm. ; Flügelänge 4.5 mm.,
nicht 8 mm., wie Mall. annimmt.

Die Ozellenplatte reicht bis an die Fühler, ist hier
abgestutzt, rotgelb, nach oben zu verdunkelt. Seiten der
Stirn mattsammetschwarz. 1 und 2. Fühlerglied weisslich.
1. breiter als lang, 2. länger als breit, fast $2\frac{1}{2}$ mal so lang
wie vorne breit, hier mit starken schwarzen Borsten. 3.
rotorange, so lang wie das 2. Borste schwarz, länger als
das 3. Scheitelblase rotgelb. Hinterkopfschwarzgrau durch
Bereifung. Behaarung weiss. Thorax rotgelb, die Mitte
verdunkelt, desgleichen der Hinterrücken. Brustseiten
und Hüften weisslichgelb, auch p_1 und 2 . p_3 ist durch
dichte kurze schwarze Behaarung dunkler. f_2 unten mit
einer Reihe feiner, weissgelber Haare. f_3 in der Spitzen-
hälfte heller, aber nicht scharf abgegrenzt; t_3 vor der

Spitze mit einer weissglänzend behaarten länglichen Stelle. Tarsen verdunkelt, Hintertarsen schwärzlich. Hinterleib rotgelb mit ganz feinen schwärzlichen Hinterrandlinien am 2.-5. Ring; die des 4. am deutlichsten. Borsten an den Seiten des 1. und 2. Tergits schwarz. Schwinger rotgelb, Knöpfchen etwas dunkler. Analsegment etwas kolbig, mit grossen, vorgequollenen hellrotgelben Genitalien. Flügel wie bei *S. obscurinotatum*, ganz hyalin. 1. Hinterrandzelle breiter als die Unterrandzelle, mündet an der Flügelspitze.

Tropidomyia aureifacies Krb., 2 ♂ von Cape Col., Katberg, 1. ii.-18. ii.

Flügelbinde zwischen Rand und 3. Längsader mit grossem hellem Einschnitt vor der Spitze. 1. Basal- und 1. Hinterrandzelle ganz hyalin. Schiller an Abdomen und Gleuren sehr spärlich, weisslich.

Pleurocerinella dioctriæformis Brun., von der Kalahari, Severelela Kooa, xi., Otawi 25. xii.

Euconops bellus Krb. 2 ♀, 1 ♂, Cape Pr., Matjesfontein, 22.-23. 10., 1.-6. 11. Worcester, ix.

Die Verteilung der Farben ist bei jedem Stück anders. 1 ♀ ist fast ganz stahlblau, nur die 2 letzten Abdominalringe sind rostrot. Theka stahlblau.

Cænoconops rhodesiensis Brun., ♀, mit der typischen Scheitelpartie.

Gesichtsgruben mit starkem Silberschimmer. Augen am Hinterrand mit kleinem dreieckigem Einschnitt, der aber nicht besonders glänzend ist. Thorax ganz schwarz. 3. Tergit mit 3 rotbraunen Seitenflecken. Theka schwarz. f_3 ganz rostbraun, ohne Verdunkelung.

Cænoconops subapicalis, sp. n., 2 ♂, Katberg, 1.-18. ii.

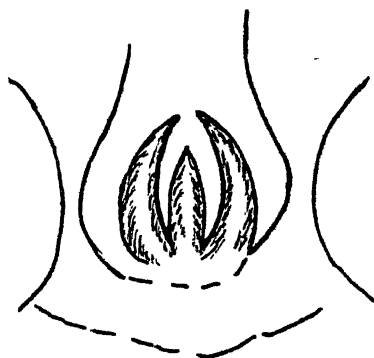
Länge 11 mm. Fühler 2·8 mm.; Flügellänge 8 mm., -breite 2·1 mm.

Untergesichtsgruben mit braunem Fleck, aber ohne Silberschimmer. Fühler schwarz, 1. Glied nur unterseits rotbraun bis gelbbraun. Thorax ganz schwarz, matt. Basis des 3. Tergits seitlich rotbraun. 1.-3. Tergit erscheinen dunkel, da sie kaum tomentiert sind; 4. und folgende weissgrauschimmernd. Flügel graulich hyalin,

Vorderrand im Basalteil mit gelblichem Ton. Es ist nur ein graulicher Apikalfleck vorhanden, der von der kleinen Querader an die Spitze vollkommen ausfüllt bis zur Discalzelle und 2. Hinterrandzelle einschliesslich. Von der Seite gesehen bildet das Hinterleibsende vom 5. Ring an fast eine Kugel. f_3 vor der Spitze etwas verdunkelt.

Von *Conops* liegen fast nur bekannte Arten vor, aber aus z. T. ganz neuen Gebieten.

Fig. 2.



Caenoconops rhodesiensis, ♀, Brun. Stirnschwiele.

Conops elegans Meig. umfasst einen ganzen Formenkreis. Meist Arten von 14–15 mm.

1. Flügel ganz braun tingiert. f. *fuscipennis* Mcq.
(*fumipennis* Ad.). Nyasaland, Karonga 7.–11. viii., Pondoland, Prt. S. John, Cap, Mossel Bay, Okahandja, 12.–18. xii.
2. Flügel mit dunkler Vorderrandbinde von ganz verschiedenem Ausmasse :
 - (a) Hüften schwarz. Hinterleib oft vorherrschend schwarz, Brustseiten oft schwarz. Griffel oft schwarz. Toment weisslich bis gelblich. Anus immer rotbraun. Fühlergriffel meistens hellrotgelb f. *nigrocoxalis* Krb.
S. Afr., Mutata, Transkei, Mossul-Bay, Swellendam.
 - (b) Hüften rotbraun.
 - (1) Pleuren schwarzgefleckt; letzte Abdominalsegmente rotbraun f. *semifumosus* Ad.
(*bequaerti* Krb. ?, *pluchus* Speis ?).
 - (2) Pleuren ganz rotbraun; letzte Abdominalsegmente schwarz f. *elegans* Meig.

Conops stylatus Krb., Pondoland, Pt. S. John, xii., Okahandja, 12.–18. xii., Pretoria, ii., Nyasaland: Domira Bay, 12. iii. Fort Johnson, Karonga, 7.–11. 7., Langenburg.

Conops bipunctatus Lw., Fort Johnson, Nyasaland.

Conops aurantius Brun., Waterberg.

Conops apicalis Krb., S.W. Africa, Okahandja, 1.–12. iv., Weenen, Natal, ii.

Conops nubeculipennis Bezzi. Uam Gebiet, S.O. Kamerun. Theka rostrot, bezw. rotgelb.

Fig. 3.



Conops decipiens Krb. Fühler.

Conops decipiens Krb., Langenburg.

Conops conspicuus Brun., Langenburg, Nyasa, 23. 6. Rukwa.

Conops erythrocephala F., Nyasaland, Langenburg, Tabara, Victoria Nyassa.

Conops zonatus Krb., Uam, S. O. Afrika, Nyassald., S. Afr., Umtata Transkei, Transvaal, Pretoria, ii., Pondoland, Pt. S. John, Mossel Bay, xii., Swellendam, xii. Charakteristisch erscheint mir die immer weinrote Hinterleibsfärbung und die sehr grosse, dornförmige Theka. Der Raum unter der *vena spuria* ist braun, manchmal die Discalzelle bräunlich.

Conops quadripunctatus Krb., Natal, Weenen, ii.

Conops conspicuus Brun. ist am ganzen Körper weisslich bereift. Bauch rötlich. Flügel bleichbraun, aber die ganze Vorderrandzelle, 1. Basalzelle, Analzelle vollkommen hyalin, Basis der Unterrand- und Discalzelle und die ganze 2. Basalzelle fast hyalin.

Conops kerteszi Krb.? Ein auffallend kleines ♀ von kaum 10 mm., mit schwarzer Thoraxplatte. Nyassa, Langenburg, 9.–12. 8. . . .

Conops apicalis var. *atrimanus* n. var., ♀, von Uam, Kamerun. Ist vielleicht nur eine Lokalrasse.

Kiel ohne Makel. Tarsen schwarz, Hintertarsen braun, Haftlappchen und Klauen gelbweiss, die Spitze schwarz. Thorax dunkelbraun mit gelblichem Toment. Beulen, Schildchen, Hinterrücken oben rostrot. Pleuren rostrot, schwarzfleckig. *p* gelbbraun. Abdomen schwarz mit etwas rötlichem Ton, besonders Analsegment und Theka. 3. Tergit mit auffallend goldgelber Binde; 4. und 5. mit weniger intensiv schillernder Binde; 6. gelbtomentiert. Flügel wie bei *ater*, stark irisierend. Type: Berlin.

Fig. 4.



Conops apicalis var. *nigrimanus*, n. var., ♀. Fühler.

Conops aureomicans Krb. 1 ♂, von Cape Prov., Worcester, i. Ist neu! Type: London.

Länge 10.6 mm. Fühler 4 mm.; Flügellänge 8 mm., -breite 2.5 mm.

Gleicht dem ♀, ist aber heller, lebhafter gefärbt, gleichmässig matt rotbraun, mit leuchtend goldgelben Hinterleibbinden und fleckenartiger Flügeltrübung zwischen der 2. und 3. Längsader nahe der Flügelspitze. 1. Fühlerglied ca. 5mal so lang wie breit. Thorax ganz rotbraun, ganz zart gelb tomentiert mit 3 rotbraunen Linien. Schildchen, Pleuren, Hinterrücken hellrotbraun. Hüften und *p* hellrotbraun. Tarsen schwarz, die des letzten Paares braun. Klauen weissgelb mit schwarzer Spitze. Haftlappchen weiss. Aller Schiller weiss. Seitenplatten des Hinterrückens goldgelb. 1. und 2. Basalzelle, Discalzelle, 1. Hinterrandzelle vollkommen hyalin. Vorderrandzelle etwas tingiert. Hinterleib rotbraun, mit etwas dunklerem Fleck auf der Mitte des 2. und 3. Tergits, die jedes eine leuchtend goldgelbe breite Tomentbinde tragen. 4. Ring eigentlich ohne Schiller, 5.-6. dicht goldgelb tomentiert. Sternite ganz rotgelb.

Conops camaronensis, sp. n., 2 ♂, 3 ♀, von Uam v. Type : Berlin.

♂. Ähnlich *C. rugifrons* Karsch. Der ganze Kopf hellrotgelb, das Untergesicht weissgelb schimmernd, an den Augen bis zum Scheitel hinauf. Fühler hellrotgelb. 1. Glied ca. $3\frac{1}{2}$ mal so lang wie breit, 2. doppelt so lang wie das 1; 3. etwas länger als das 1. Griffel und Seitenfortsatz lang. Hinterkopf rotbraun, weiss schillernd. Thorax ganz rostrot, Platte und Hinterrücken schwarz mit Weissm. Schiller. Schwinger braun, Stiel gelblich. *p* gelbbraun, Tarsen schwarz, die der *p*₃ bräunlich, Klauen weissgelb mit schwarzer Spitze. Haftläppchen weissgelb. Hinterleib düster rotbraun mit gelblichem Ton, die Mitte unbestimmt verdunkelt; Schiller weisslich. Flügel glashell, Binde hellbraun. 1. Basalzelle vollkommen hyalin, 1. Hinterrandzelle mit hyalinem Fleck, die Spitze wieder braun. Discalzelle hyalin, hinten der Länge nach und an der abschliessenden Querader breit braun gesäumt.

Fig. 5.



Conops camaronensis, sp. n. Fühler.

Das ♀ gleicht dem ♂, ist aber bedeutend dunkler. Thorax eigentlich grauschwarz mit rotbraunen Beulen und solchem Schildchen. Hinterleib schwarzgrau. 6. Tergit und Analsegment nebst Theka rostrot. Flügel intensiver gefärbt, aber der Fleck in der Discalzelle ist viel grösser.

♂, Länge 9 mm. Fühler 2 mm.; Flügellänge 8 mm., -breite 2.1 mm.

♀, Länge 8 mm. Fühler 2 mm.; Flügellänge 6 mm., -breite 2 mm.

Bezüglich der Gattung *Conops* verweise ich auf meine letzten Arbeiten: *Conopidae of South Africa*, Ann. Transv. Mus. vol. 14, pt. 2 (1931); Nachträge dazu in *Konowia*, vol. 12 (1933), und *Omphraliden, Thereviden und Conopiden vom Belg. Kongo und den Nachbargebieten*, *Revue Zool. et Bot. africaines*, vol. 28, fasc. 2 (1936).

Ich gebe folgende Synonymie bzw. Umbenennungen bekannt:—

- Conops bicolor* Krb. ist *Cænoconops rhodesiensis* Brun., ♀.
 — *obscurus* Brun. ist *Conops rugifrons* Karsch, ♂♀.
 — *brunnipennis* Krb. (♂) ist *Conops brunneifrons* Krb. (?).
 — *stylatus* Krb. ist var. von *Conops capensis* Wied.
 — *ater* Macq. = *Physoconops*.
 — *tuberculata* Brun. = *Physoconops*.
 — *insularis* Krb. = *Archiconops*.

Conops camaronensis unterscheidet sich wie folgt von *C. rugifrons* Karsch.

Vorderrandzelle dunkelbraun; 1. Hinterrandzelle ganz braun tingiert.....	<i>C. rugifrons</i> .
Vorderrandzelle heller; 1. Hinterrandzelle mit grossem, hyalinem Fleck, die Spitze wieder braun. Hintere Querader breit braun gesäumt	<i>C. camaronensis</i> .

ARCHICONOPS, gen. n.

Tiere von 15–17 mm. Länge, die mehr Bienen als *Conops*arten gleichen. Der ganze Hinterleib ist eine einheitliche Walze, die in der Mitte kaum etwas dicker wird. 2. und 3. Ring von gleicher Länge, das Analsegment in der Längsrichtung des Körpers liegend, anstatt quergestellt, wie bei allen *Conops*. Geäder durchaus wie bei *Conops*. Flügel gleichmässig tingiert, ohne farbiges Stigma.

Hierher gehört (*Conops*) *insularis* Krb. von St. Thomé und eine neue Art.

A. niger, sp. n., ♂ von Madagaskar, Ampanalana, 14. 6. Type: London.

Länge 18 mm. Fühler 2 mm.; Flügellänge 12·5 mm., -breite fast 5 mm.

Kopf düster mahagonifarben, glanzlos. Die Gruben düster gelb, weisslich schimmernd. Augenränder schmal silberweiss, an der Grenze zwei schwarze Punkte. Scheitelblase düster rotbraun. Hinterkopf schwarz. Rüssel ca. 1½ mal kopflang. 1. Fühlerglied düster rotbraun, ca. 5 mal so lang wie breit. Stirn fast bis zu Schwarz verdunkelt. Thorax schwarz, glanzlos, durch Toment etwas olivbraun. Pleuren düster mahagoni, glanzlos, mit ganz zartem grauweissem Hauch. *p* düster mahagonibraun; Tarsen schwarz. Klauen schwarz. Schildchen düster

mahagonibraun. Hinterrücken schwarz, glanzlos. Abdomen glänzend schwarz, teilweise in Mahagoni übergehend. Abdominalspitze heller rotbraun. Flügel gleichmässig gelbbraun, nur die 1. Basalzelle und die Discalzelle erscheinen etwas heller. Kein Stigma. Alles andre wie bei *C. insularis* Krb.

Physoconops Szil. umfasst bisher 2 Arten der Region :

Physoconops ater Macq., ♂♀, liegt vor von Cape Prov., Queenstown, 16. 1.—10. 2; Katberg, 1.—10. 2.

Physoconops tuberculata Brun., ♂, von Salisbury, iii. 14 mm.

1. Fühlerglied ca. 5 mal länger als breit. Das Gesicht schimmert teils silberweiss, teils satt goldgelb. Pleuren mahagonibraun, auch die Schulterbeulen und das Schildchen. t_3 ohne dunklen Ring. 1. Hinterrandzelle an Basis und Vorderrand etwas braun tingiert, desgleichen die Discalzelle und ein Fleck oder Saum der Analzelle.

DACOPS Krb.

Dacops apicalis Krb. ist das ♂ zu *D. abdominalis* Krb. Syn. ist auch *patellifrons* Ség. Die Art liegt vor von Kasenga, 31. 1.; Natal—Weenen, 1. 3.; Erythræa—Ghinda; Cape Prov., Katberg, 1.—10. ii.

PSEUDOPHYSOCEPHALA, gen. n.

Bisher stelle ich 8 Arten in dies Genus, die sich folgendermassen unterscheiden lassen.

Weibchen.

1. Sehr dicht und lang behaarte Art. Vorder-
randzelleschwarz. Thekanichterkennbar.
2., 3. und 4. Tergit gleich lang. 1. Hinter-
randzelle kurz, ganz ausgefüllt. 1. Fühler-
glied stark, kaum doppelt so lang wie breit.
Kiel schwarz *P. hirta*, sp. n.
- Fast nackte Arten mit deutlich sichtbarer
Theka 2.
2. Spitze der 1. Basalzelle und Basis der 1.
Hinterrandzelle (noch oberhalb der *vena*
spuria) hyalin. Kiel gelb. 1. Fühlerglied
ca. $2\frac{1}{2}$ mal so lang wie breit. Thorax hell-
rotbraun, mit 3 klaren schwarzen Strie-
men. Schild'chen, p rotbraun. f_3 mit
klarem, schwarzem Ring. Der schwarz-
braune Fleck der 1. Hinterrandzelle tritt
über diese hinaus als Saum auf die hintere
Querader über. *P. fenestralis*, sp. n.

- Spitze der Basalzelle und Basis der 1. Hinterrandzelle nicht hyalin 3.
3. Untergesicht ganz gelb, überall silberweiss schimmernd *P. capensis* Wied.
Untergesicht ohne Silberschimmer 4.
4. Schildchen und Hinterrücken schwarz. *p* rotbraun. *f*₃ etwas verdunkelt. Tarsen tief schwarz *P. nigratarsis*, sp. n.
Schildchen und Hinterrücken rotbraun oder gelbbraun 5.
5. 1. Fühlerglied ca. 4 mal so lang wie unten breit; 2. ca. 2 mal so lang wie das 1. ... *P. curta* Krb.
1. Fühlerglied ca. 2–3 mal so lang wie unten breit; 2. ca. 2½ mal so lang wie das 1. ... 6.
6. *f*₃ rotbraun, ohne schwarze Binde. Griffel bedeutend länger als der Seitenfortsatz. Kiel schwarz *P. constricta* Krb.
*f*₃ rotbraun mit ± deutlicher schwarzer Binde. Griffel und Seitenfortsatz gleich lang. Kiel gelb *P. platycephala* Lw.

Männchen.

1. Flügelvorderrand bis zur 2. Längsader glashell. Der Flügelfleck bedeckt nur die Unterrandzelle und die Basalhälfte der 1. Hinterrandzelle. Diese Zelle ist von der hintern Querader ab hell. Die Spitzenquerader ist merkwürdig geschwungen und steigt fast senkrecht in die 2. Längsader hinein 2.
Flügelvorderrand tief schwarz oder schwarzbraun 3.
2. Abdomen sehr kurz gestielt; 2.+3. Segment fast gleich lang, der Rest kugelig... Abdomen sehr lang gestielt; 2. Segment fast um die Hälfte länger als das 3. *P. caenoneura*, sp. n.
P. stylata, sp. n.
3. Spitze der 1. Basalzelle und Basis der 1. Hinterrandzelle auch oberhalb der *vena spuria* glashell. Der braune Fleck der 1. Hinterrandzelle tritt über diese hinüber als breite Säumung der hintern Querader. Spitze der 1. Hinterrandzelle fleckig braun, desgleichen die der 2. an dieser Stelle. Thorax hellrotbraun mit 3 zusammengefloßenen schwarzen Striemen. Schildchen, *p* hellrotbraun; *f*₃ mit deutlichem, schwarzem Ring. *P. fenestralis*, sp. n.
- Spitze der Basalzelle und Basis der 1. Hinterrandzelle schwarz ausgefüllt 4.
4. Kleine Querader fehlt. 1. Hinterrandzelle nur bis zur hintern Querader dunkelbraun, auch unterhalb der *vena spuria*; der Rest absolut hyalin. In der Spitze ein brauner Fleck, der über die Zelle hinaus in die 2. Hinterrandzelle eintritt. Thorax und Schildchen hellrotbraun; die 3 Striemen zu einem schwarzen Mittelfleck verschmolzen. *p* rotbraun. *f*₃ mit scharf begrenztem, schwarzem Ring.

- Tarsen rotgelb. Kiel und Gruben glänzend schwarz *P. annulipes*, sp. n.
 Kleine Querader normal ausgebildet 5.
 5. *p* schwarzbraun, Knie etwas gelblich. 1. Hinterrandzelle unterhalb der *vena spuria* glashell. 1. Fühlerglied ca. 4 mal länger als breit *P. uganda*, sp. n.
p rotbraun, *t*-basen hellrotbraun. 1. Hinterrandzelle unterhalb der *vena spuria* dunkel. 6.
 6. *f*₃ mit ± deutlichem schwarzbraunem Ring. Tarsen tiefschwarz *P. platycephala* Lw.
*f*₃ rotbraun ohne merkliche Verdunkelung. Tarsen bräunlich *P. constricta* Krb.

Pseudophysocephala platycephala Lw. liegt vor von Uganda, Ruwenzori, xii.; Cape Prov., George, 27. 6.—1. 7. Katberg, 15. i.—12. iii. Somerset East, xi., Swellendam, xi.

Pseudophysocephala constricta Krb., E. Cape Prov., Katberg, 1.—10. ii., Queenstown, 16. i.—10. ii.

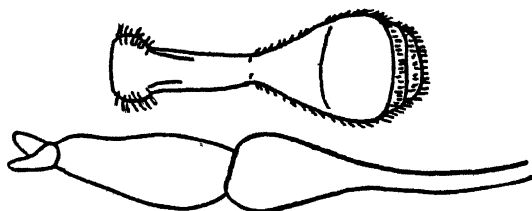
Pseudophysocephala hirta, sp. n., ♂, Cape Prov., Katberg, 1.—10. ii. Type: London.

9 mm. Schwarz mit rötlichem Ton und dichter, langer, schwarzer Behaarung. Kopf etwas fahl gelbbraun, ohne Silberschimmer, glanzlos. Am untern Augenrand ein kleiner, schwarzer Strich. Kiel schwarz. Scheitel glasig rotbraun; von ihm geht eine breite schwarze Strieme zu den Fühlern, spaltet sich und begleitet die Untergesichtsgruben noch fast bis zur Mitte. 1. Fühlerglied rotgelb, ca. doppelt so lang wie breit, dick, nicht länger als die Kopfbehaarung. Hinterkopf schwarz, am Augenrande weiss-schimmernd. Thorax durch gelbliches Toment etwas oliv schimmernd, davon sich die 3 Striemen deutlich abheben. Schildchen und Pleuren oliv, Hinterrücken tiefschwarz. Schwinger rotgelb, Stirn bräunlich. *p* düster rotbraun, Hüften und *t* aussen silberschimmernd. Tarsen schwärzlich, Haftlappchen gelblich. Klauen rotbraun mit schwarzer Spitze. Hinterleib merkwürdig geknickt. 2. und 3. Ring gleich lang, 3. von Anfang an sich gleichmässig verbreiternd, gleich dem 4. in Seitenansicht viel höher als breit. 4. am Anfang fast gekielt. Analsegment wie bei einem ♀ gebaut, lang kegelig, glänzend rotgelb. Flügel hyalin mit schwarzer Binde bis zur 4. Längsader. Spitze der 1. Hinterrandzelle nur aufgeheilt, nicht hyalin. Discalzelle unten bis zur Spitze schwarz gesäumt; die Spitzenhälfte hyalin. 1. Hinterrandzelle ziemlich rundlich endend.

Pseudophysocephala caenoneura, sp. n., ♂, vom Nyassa See, Langenberg, 26. 6.–8. 8. Type: Berlin.

8 mm. Kopf ganz glanzlos, dunkelgelb, nur um die Fühler mit schwarzem Hufeisenfleck. Scheitelblase hellbraun, davor eine warmbraune Querbinde mit einem senkrechten Strich zu den Fühlern. Diese sind braun. 1. Glied hellrotgelb, ca. $3\frac{1}{2}$ mal so lang wie breit, 2. doppelt so lang wie das 1., 3. = dem 1. Griffel und Seitenfortsatz lang und dünn. Hinterkopf schwarz, am Augenrand silbern. Thorax dunkelbraun, Schulterbeulen, Schildchen, Platten des Hinterrückens hell schokoladenbraun, fast ohne jeden Schimmer. *p* hellrotbraun, Tarsen schwarz, *t*-basen gelbweiss, Klauen und Haftläppchen sehr klein, braun. Schwinger rotgelb, Stielbasis schwarz. Hinterleib sehr kurz, kaum so lang wie Kopf und Brust zusammen, merkwürdig kugelig; 2. und 3. Ring gleich

Fig. 6.



Pseudophysocephala caenoneura, sp. n., ♂. Fühler, Abdomen.

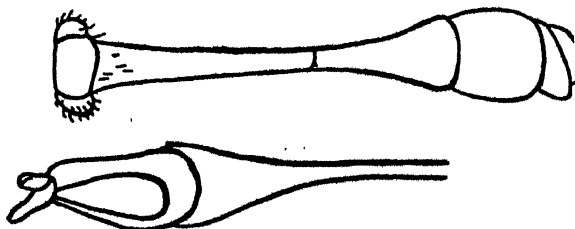
lang, der Rest eine Kugel bildend, im Ton warm rotbraun, die Basis des 3. weiss-schimmernd, sein Ende und der ganze Rest goldgelb; Analsegment glänzend rotbraun. Flügel hyalin. Es ist nur ein zarter Spitzenfleck vorhanden. Der liegt in der Unterrandzelle, deren Ende wieder aufgehellt ist, und in der Basalhälfte der 1. Hinterrandzelle, deren Spitze von der hintern Querader an hyalin ist. Die abschliessende Ader ist merkwürdig geschwungen, indem sie von der hintern Querader an erst eingebuchtet beginnt.

Pseudophysocephala stylata, sp. n., ♂, von Langenberg, 1.–26. 7. Type: Berlin.

8 mm. Kopf wie bei *caenoneura*, aber 2. und 3. Fühlerglied fast schwarz. Thorax oben fast schwarz, sonst

leuchtend rostrot. Hinterrücken unten schwarz. *p* rotbraun, *t*-basen gelbweiss, Tarsen braun. Haftläppchen und Klauen länger und heller. Hinterleib ausserordentlich schlank, viel länger als bei *cænoneura*, die letzten Ringe einen länglichen Tropfen bildend. 2.-4. Tergit am Hinterrand fein silberschillernd, der Rest gelblich tomentiert. Grundfarbe olivbraun. Flügel wie bei *cænoneura*, aber die Unterrandzelle an der Vorderseite hyalin. Die kleine abschliessende Ader der 1. Hinterrandzelle ist weniger deutlich geschwungen. Der Raum unter der *vena spuria* ist hyalin.

Fig. 7.

*Pseudophysocephala stylata*, sp. n., ♂. Fühler, Abdomen.

Pseudophysocephala fenestralis, sp. n., ♂♀. ♀: Cape Prov., George, 27. 6-1. 7. Type: London. ♂: Nyassasee, Langenburg, 19. 5. Type: Berlin.

♀. 8.5 mm. Der ganze Kopf lebhaft rotgelb, um die Fühler herum ein feiner brauner Hufeisenstrich. Gruben allein gelb. Fühler rotgelb; 1. Glied ca. 3 mal so lang wie

Fig. 8.

*Pseudophysocephala fenestralis*, sp. n., ♂. Fühler.

breit; 2. ca. doppelt so lang wie das 1.; 3. ca. $\frac{2}{3}$ vom 2., dunkler. Endgriffel kurz, breit, plötzlich abgestutzt, Seitenfortsatz dünn, doppelt so lang. Hinterkopf schwarz, an den Augen weiss-schimmernd. Rüssel kurz, rotbraun, an beiden Enden schwarz. Thorax leuchtend rostrot mit 3

schwarzen Striemen, weiss schimmernd. Pleuren rostrot, schwarzfleckig mit Schillerstrieme. p rotbraun, f_3 mit klarem schwarzem Band, t -basen gelbweiss. Tarsen braun, Haftlappchen gelblich. Klauen rotbraun mit schwarzer Spitze. Schwinger weissgelb. Schildchen und oberer Teil des Hinterrückens brennend rotbraun, unterer tiefschwarz. Hinterleib rotbraun. 1. Ring parallelrandig, so lang wie der 2., allmählich dicker werdend, der 3. am dunkelsten, 2. mit Silberbinde am Hinterrand, 3. und 4 mit gelblicher Binde, 5. und 6. fast ganz gelblich bestäubt. Theka klein, breit, rotbraun, unten schwarz. Flügel hyalin, Binde schwarzbraun, z. T. mit warmem rötlichem Ton. Spitze der Unterrandzelle etwas heller, rauchig. 1. Hinterrandzelle in der Basalhälfte rotbraun, über die Querader als feiner Saum hinübergreifend. Raum unter der *vena spuria* hyalin, oberhalb derselben fein subhyalin, desgleichen die Spitze der 1. Basalzelle, so dass hier ein deutliches helles Fenster entsteht. Discalzelle unten fast bis zur Spitze fein braun gesäumt. 1. Hinterrandzelle kurz, etwas breiter als die Unterrandzelle.

Cape Prov., George, 27. 6.–1. 7.

♂. Fast 9 mm. Gleicht in allem dem ♀. Hinterleib viel heller, am 5. Ring am dunkelsten, 6. hell rotbraun. Flügel intensiver schwarzbraun. Die Binde tritt über die Gabelader hinweg, hier einen deutlichen Fleck in der 1. Hinterrandzelle und 2. Unterrandzelle bildend. Das Fenster ist absolut hyalin, die hintere Querader schwarzbraunfleckig.

Pseudophysocephala ugandæ, sp. n., ♂. Uganda, Ruwenzori, xii., Mpange Forest. Type: London.

Untergesicht leuchtend rotgelb, Backen rötlichbraun. Gruben weisslichgelb, Kiel gelb. Kein Schiller. Scheitelblase düster rotbraun, fast schwarz. Davor eine sametschwarze Querbinde scharf abstechends, von der eine senkrechte Strieme zu den Fühlern geht, diese hufeisenförmig bis zur Hälfte des Untergesichts begleitend. Hinterkopf schwarz, am Augenrand fein silberweiss. Thorax, Schildchen, Hinterrücken tief schwarz, glanzlos. Schulterbeulen düster mahagonibraun, weiss schimmernd. Pleuren mahagoni, schwarzfleckig, weissbereift. p_{1+2} düster gelbraun, besonders die f . p_3 fast schwarz. Tarsen

schwarz, an p_{1+2} braun. f_3 fast ganz weiss-schillernd. t_3 mit merkwürdiger Einschnürung, als ob hier ein Einschnitt sei. Die Stelle ist heller braun. Schwinger weiss-gelb. Hinterleib äusserst schlank, schwarz, glanzlos, unterseits düster rotbraun, besonders am 2. und 3. Ring, hier auch seitlich. Ring 3 mit weiss-schimmerndem Hinterrandsaum. Genitalien schwärzlich. Flügel hyalin, Binde schwärzlich, nach der Spitze zu etwas blasser. 1. Hinterrandzelle lang, aber rundlich endend, die Spitzenpartie etwas aufgehellt. Vorderrand bis zur Spitze braun. Unterhalb der *vena spuria* glashell. Discalzelle an der Spitze hyalin, der Unterrand fast bis zum Ende gebräunt. Fühler schlank, schwarz. 1. Glied ca. 4 mal so lang wie breit; 2. ca. $2\frac{1}{2}$ mal so lang wie das 1., 3. = dem 1. Griffel und Seitenfortsatz gleich lang, stabförmig. (Steht nahe *P. curta* Krb. !)

Pseudophysocephala nigritarsis, sp. n., ♀. Länge 9·5 mm.
Uganda, Ruwenzori, xii. Port Natal. Type:
London.

Gleicht *ugandæ*. Kopf blasser. Scheitelblase mahagonibraun, davor etwas braun mit feiner brauner Strieme bis zu den Fühlern, diese hufeisenförmig umfassend. Fühler wie bei *ugandæ*. 1. und 3. Glied heller, rotgelb. Griffel und Seitenfortsatz kürzer. Thorax mahagonibraun, die Mitte schwarz, Schildchen und Hinterrücken fast schwarz. Schulterbeulen weisslich schimmernd. Pleuren rotbraun, weiss schimmernd. p gelblich rotbraun; f_3 mit unscharf begrenztem schwärzlichem Ring. Tarsen tief schwarz. Schwinger rotgelb, Stielbasis schwärzlich. Hinterleib von eigentümlicher Form wie bei gewissen orientalischen Conopiden, d. h. der 2. Ring ist parallelrandig, dann setzt der 3. Ring plötzlich ab, so dass ein richtiger Kolben entsteht. der 4. Ring am breitesten. 1., 2., 3., Ring fast gleich lang. Analsegment und Theka klein, wenig vorstehend. Hinterleib schwarz, die Grenze des 2. und 3. Ringes, Analsegment und Theka düster rotbraun; 2. und 3. mit goldgelbem Hinterrandsaum, der Rest fast ganz gelb bestäubt. Von oben gesehen, erscheint der Hinterleib verhältnismässig schlank. Flügel hyalin, Binde schwarzbraun, Vorderrandzelle etwas gelbrötlich im Ton. Spitze der 1. Hinterrandzelle wolkig aufgehellt. Die Zelle ist breiter als die

Unterrandzelle. Discalzelle unten fast bis zur Spitze schwarz gesäumt.

Pseudophysocephala annulipes, sp. n., ♂. Kenya, Aberdare Range, x. Type: London.

Fast 9 mm. Hat grosse Ähnlichkeit mit *P. fenestralis*. Sofort erkennbar an der fehlenden kleinen Querader, wodurch die Discalzelle eine ganz andre Gestalt erhält. Kopf gelbbraun. Backen, Stirn, Scheitelblase rotbraun. Hufeisenzeichnung schwarz. Untergesicht mit breitem, tiefschwarzem Kiel. Fühler hellrotgelb. 1. Glied 3mal so lang wie breit, 2. ca. doppelt so lang wie das 1., 3. = $\frac{2}{3}$ vom 2. Griffel und Seitenfortsatz lang, gleich lang. Hinterkopf schwarz, am Augenrand fein silberweiss. Thorax, Schildchen, Hinterrücken, Pleuren, *p* leuchtend rostrot. Thoraxplatte, untere Partie des Hinterrückens, Fleckung der Pleuren schwarz, glanzlos. Hüften schwarz, gelblich schimmernd. Alle *f* oben mit scharf begrenzter schwarzer Makel, *f*₃ mit breitem Ring. Tarsen hellrotgelb, Klauen rotbraun mit schwarzer Spitze. Haftläppchen gelb. Schwinger rotgelb, Stielbasis braun. Hinterleib schwarz, glanzlos, Seiten und Bauch rotbraun wie die Grenze des 2. und 3. Tergits. 1. und 2. Tergit mit weisslichem Schimmer am Hinterrand, 3. und 4. mit gelbem, der Rest gelb. Genitalien rotbraun. Flügel hyalin, Binde braunschwarz wie bei *fenestralis*. Da die kleine Querader fehlt, ist die Discalzelle grösser und breiter.

Pseudophysocephala constricta Krb., ♂.

9 mm. Kopf gelbbraun, glanzlos, Kiel fein, schwarz, auch die Hufeisenzeichnung. Stirn mit senkrechtem, schwarzem Strich. Scheitel und Backen rotbraun. Fühler rotbraun. 1. Glied gelbbraun, ca. $2\frac{1}{2}$ mal länger als breit, 2. ca. $2\frac{1}{2}$ länger als das 1.; 3. = $\frac{2}{3}$ vom 2. Griffel und Seitenfortsatz kegelförmig, letzterer sehr kurz. Thorax düster rotbraun, gelb tomentiert, daher oliv mit schwarzen Striemen. Schulterbeulen, Schildchen, Hinterrand des Thorax, obere Partie des Hinterrückens rotbraun. Schiller zwischen den Schulterbeulen besonders hell. Pleuren schwarzbraun, glanzlos. *p* einheitlich braun ohne schwarzen Ring an den *f*₃. Tarsen bräunlich. Schwinger gelb, Stielbasis schwärzlich. Hinterleib

schwarzbraun, unten und seitlich z. T. rotbraun. 3. und 4. Tergit mit weisslichem Saum, der Rest gelblich tomentiert. Genitalien rotbraun. Flügel hyalin, Binde schwärzlich, nicht sehr intensiv, die 2. Unterrandzelle ausfüllend und die 1. Hinterrandzelle fast ganz.

Cape Prov., Somerset East, 10.–22. x.

Pseudophysocephala platycephala Lw., ♂.

Gleicht der vorigen, aber f_3 mit $\pm$ deutlichem schwarzem Ring. Kiel gelb. Fühlergriffel kleiner. Flügelzeichnung schärfer begrenzt. 1. Hinterrandzelle mit heller Makel, 2. Unterrandzelle nur an der Spitze etwas bräunlich. Tarsen schwarz. Schwinger rotgelb mit schwarzer Stielbasis.

Uganda, Ruwenzori, xii.

PHYSOCEPHALA Schin.

P. interrupta Bezzi liegt in allen Varietäten und Übergangsformen var. Ich möchte zu diesem Formenkreis auch *rubicunda* Krb. als hellste Variante stellen, bei der der Spitzenfleck vollkommen fehlt. 2 ♀ mit Schwarzfleckung am Abdomen bilden klar den Übergang. Die Tiere sind wesentlich grösser. Den ♀ von *interrupta* fehlt fast stets der schwarze Fleck in den Gesichtsruben, sie würden also der Form *flavifacies* Krb. entsprechen. Die ♂ und ♀, bei denen die Unterrandzelle bis zur Spitze einheitlich braun gefärbt ist, bilden die gleichfalls meist grössere Form *limbata* Krb. Ich vermute, dass auch *minutissima* Krb. in diese Gruppe gehört und wahrscheinlich die kleinste und dunkelste Form vorstellt. Es liegen also ähnliche Verhältnisse vor wie bei *P. pusilla* Meig. und *P. limbipennis* de Meij.

Mir liegen diesmal 65 Ex. vor. und zwar.

Physocephala interrupta Bezzi von Aus, xii., Prince Albert Rd., Matjesfontein, Aliwal North, Otavifontein, 25. xii. Eine Var. aus Aus, xii.; ein Übergang zu *minutissima* Krb.

v. *limbata* Krb., Aus, Prince Albert Rd., Matjesfontein, Somerset, 27.–31. 5. Harrismith, Aliwal North, 1.–13. i. Katberg, 1.–10. ii. Drakensburg, xii.

v. *flavifacies* Krb., Aus, Prince Albert Rd., Little Karroo, 17.–25. vi.

v. *rubicunda* Krb., Mossel Bay i., Swellendam, 3.–14. xii., Matjesfontein, 1.–18. xii. Ceres, xii.

Physocephala bimarginipennis Karsch, wohl Vertreter einer eignen Gattung, da die 1. Hinterrandzelle langgestreckt ist wie bei *Conops*. Eine der grössten Arten mit merkwürdig mattem, weissem Reif, ohne jeden Schiller. Fühler rotbraun. 1. Glied ca. 2 mal so lang wie breit; 2. ca. 4 mal so lang wie das 1.; 3. ca. $2\frac{1}{2}$ –3 so lang wie das 1., sich schnell verjüngend. Griffel und Seitenfortsatz kurz, aber stark. Hüften rötlich, *f* dunkelbraun, oben schwarz verdunkelt. Klauen dunkelbraun, Schwinger gelb mit schwarzem Knopf und schwarzer Basis. 3. Tergit ohne weissen Schimmer, daher dunkler erscheinend. Theka kurz, oben rotbraun. Länge 17 mm. Flügel 15 mm. ! 2 ♀, Kambove, Nyasaland, 11. ix.

Physocephala halterata Brun. Die abschliessende Quader der Discalzelle ist deutlich braun gesäumt. Pondoland, 6.–25. ii. Mossel Bay, Port St. John, Harrismith, 5 ♀, 3 ♂. Das ♂ ist neu; gleicht in allem dem ♀, ist nur schlanker.

Physocephala ruficoxa Krb. Letztes Tarsenglied verdunkelt. Analsegment hellrotbraun. 2 ♂, 1 ♀, Katberg. Das ♀ ist neu. Gleicht in allem dem ♂. Abdominalbasis oben unscharf verdunkelt, vom 5. Segment an nebst Theka gelbrot. Theka und Analsegment klein. Tarsen ganz rotgelb. Brustseiten mit einem schwarzen Doppelfleck über den Mittelhüften und einem kleineren dahinter. 2. und 3. Tergit fast gleich lang! 2. mit intensivem Silberschimmer am Hinterrand. 1.–3. seitlich und unten rotbraun. 3. und 4. schwarz, hinten goldschimmernd, der Rest ganz goldgelb tomentiert. Thorax mit 3 zusammengeflossenen Striemen auf leuchtend rotbraunem Grund. ♀ von Katberg, 11.–26. ii. Type ♀: London.

Physocephala digitata Speis, Johannesburg, Transvaal; Estcourt, ix.–x., Natal; Basutoland. 1 ♂ ohne Ring an *f*₃. Der Raum hinter der *vena spuria* nur wenig aufgeheilt. Beim ♂ von Natal sind Griffel und Seitenfortsatz sehr kurz.

Das ♂ von Basuto ist mit einem ♀ zusammen montiert (in coitu), das m. E. zu *P. limbata* Krb. gehört.

Es liegt noch eine nov. spec. von Worcester vor; offenbar gehören ♂ und ♀ zusammen. Auffallend lebhaft rostrot gefärbt. Das Abdomen des ♀ erinnert an die Gattung *Anticonops*.

Physocephala frontalis Szil. Type: Budapest. Von S. Kamerun.

Kopf hellgelb, Backen hellbraun, glanzlos. Stirn vor der Scheitelblase schwarz, sich bis zur Breite des Fühlerhöckers verjüngend. In dieser Partie liegt oberhalb der Fühler eine regulär quadratische Grube mit steilen Wänden, nur vom Fühlerhöcker aus allmählich sich vertiefend. Scheitelblase tiefschwarz, ziemlich glanzlos, dicht lang schwarz behaart; Hinterkopf schwarz, grauweiss bestäubt, wie verschimmelt. Thorax schwarz, grauweiss tomentiert, nur die Schulterbeulen etwas rotbraun und Teile der Pleuren. Alle Hüften und *p* hellbraun, einschliesslich der Tarsen. Schwinger weissgelb. Hinterleib schwarz, glanzlos, grau bereift; nur das 2. Tergit ± rotbraun schimmernd. Es ist so lang wie 3. und 4. zusammen. Der hyaline Teil der Flügel ist stark irisierend, die Binde satt schwarzbraun. Spitze der 1. Hinterrandzelle aufgeheilt, unterhalb der *vena spuria* glashell, desgleichen die Spitze der Discalzelle. 10·5 mm.

Bezüglich dieser Gattung verweise ich auf dieselben Arbeiten wie bei *Conops*. Ich gebe folgende Synonymie bzw. Umbenennung bekannt:

Physocephala capensis Krb. ist *Pseudophysocephala capensis* Krb.

— *constricta* Krb. = *Pseudophysocephala*.

— *curta* Krb. = *Pseudophysocephala*.

— *decisa* Brun. = ? *P. limbata* Krb.

— *fascipennis* Brun. = *Dacops abdominalis* Krb.

— *rubicunda* Krb. = *P. interrupta* Bzzi. var.

— *nigrococa* Brun. = ? *P. ugandæ* Krb.

— *patellifrons* Ség. = *Dacops abdominalis* Krb.

— *platycephala* Lw. = *Pseudophysocephala*.

— *tuberculata* Brun. = *Physoconops*.

— *gigantea* Krb. = *Archiphysocephala*.

Bestimmungstabelle der Arten.

Weibchen.

- | | |
|---|--|
| 1. 1. Basalzelle vollkommen hyalin | 2. |
| 1. Basalzelle ganz oder teilweise braun ... | 7. |
| 2. Die Flügelbinde reicht bis zur Mündung
der 2. Längsader | 3. |
| Die Flügelbinde füllt die Unterrandzelle
vollkommen aus | 5. |
| 3. Apikalfleck vorhanden | <i>P. interrupta</i> Bzzi. |
| Apikalfleck fehlt | 4. |
| 4. Stirnstrieme und <i>p</i> schwarz | <i>P. nigerrima</i> Krb. |
| Stirnstrieme fehlt; <i>p</i> rostrot | <i>P. gracilis</i> Krb. |
| 5. Düstere, matt schwarzbraune Art ohne
rotgelbe Partien | [Krb.]
<i>P. madagascariensis</i> |
| Hellrotgelbe glänzende Arten | 6. [bata Krb.] |
| 6. Schildchen leuchtend rotbraun | <i>P. interrupta</i> var. <i>lim-</i> |
| Schildchen tiefschwarz | <i>P. nigroscutellata</i> Krb. |
| 7. 1. Basalzelle zur Hälfte braun, zur Hälfte
hyalin | <i>P. decisa</i> Brun. |
| 1. Basalzelle vollkommen tingiert | 8. |
| 8. Unterrandzelle mit hyalinem oder sub-
hyalinem Spitzenfleck | 9. |
| Unterrandzelle bis zur Spitze satt braun
oder schwarzbraun | 10. |
| 9. Art von 9 mm. Spitzenmakel in der Unter-
randzelle hyalin. Halteren gelb | [(<i>nigrocoxa</i> Brun.).
<i>P. ugandæ</i> Krb.] |
| Art von 14 mm. Spitzenmakel in der
Unterrandzelle grau. Haltere mit
schwarzem Knopf | [var. <i>congoënsis</i> Krb.
<i>P. halterata</i> Brun. und |
| 10. Alle Flügelzellen sehr lang gestreckt, be-
sonders die 1. Hinterrandzelle. Diese
und die Discalzelle vollkommen braun . | [Karsch.]
<i>P. bimarginipennis</i> |
| Alle Zellen von gewöhnlicher Form | 11. |
| 11. Discalzelle bis auf einen hyalinen Spitzen-
fleck dunkelbraun | 12. |
| Discalzell grösstenteils oder ganz hyalin . | 13. |
| 12. Coxen, Schildchen und Hinterrücken
schwarz | [(s. 9!)]
<i>P. nigrocoxa</i> Brun. |
| Coxen grösstenteils rotbraun. 1. Tergit
rotgelb | <i>P. ruficoxa</i> Krb. |
| 13. 1. Fühlerglied 3-4 mal so lang wie unten
breit | 14. |
| 1. Fühlerglied mindestens 6 mal so lang wie
unten breit | 16. |
| 14. Kleine Querader sehr kurz oder fehlend .. | <i>P. microvena</i> Brun. |
| Kleine Querader normal | 15. |
| 15. Backen mit braunem Fleck | <i>P. abyssinica</i> Krb. |
| Backen ohne Fleck | <i>P. pubescens</i> Brun. |
| 16. Schwinger rotgelb | <i>P. simplex</i> Krb. |
| Schwinger mit schwarzem Knopf | <i>P. halterata</i> Brun. und
[var. <i>congoënsis</i> Krb.] |

Männchen.

- | | |
|--|-----------------------------|
| 1. Flügel ganz hyalin | <i>P. vitripennis</i> Curr. |
| Flügel mit Zeichnung | 2. |
| 2. 1. Basalzelle vollkommen hyalin | 3. |
| 1. Basalzelle braun tingiert | 13. |

3. Fühlergriffel und Seitenfortsatz kleine Knöpfe bildend 4.
Fühlergriffel und Seitenfortsatz stets länger als breit 5.
4. Kleine Art von 6 mm. *P. minutissima* Krb.
Grosse Art von 13 mm. vom Habitus der *P. rufipes* F. *P. similis* Krb.
5. Flügelbinde an der Mündung der 2. Längsader abgebrochen 6.
Flügelbinde füllt die Unterrandzelle bis zur Spitze aus 8.
6. Am Ende der Unterrandzelle liegt ein deutlicher Apikalfleck. f_3 mit braunem Ring *P. interrupta* Bzzi.
Flügel ohne Apikalfleck 7. [*rubicunda* Krb.]
7. Einfarbig rostbraun. f_3 ohne Ring *P. interrupta* var.
Einfarbig schwarz *P. gracilis* Krb.
8. 2. Fühlerglied ca. $2\frac{1}{2}$ mal so lang wie das 1. *P. intermedia* Krb.
2. Fühlerglied kaum 2 mal so lang wie das 1. 9.
9. 1. Fühlerglied ca. 5–6 mal so lang wie breit; 3. fast so lang wie das 1. *P. longicornis* Krb.
1. Fühlerglied 2–3 mal so lang wie breit; 3. kaum $\frac{1}{2}$ vom 1. 10.
10. Grosse hellrotgelbe oder rostrote, glänzende Art. Untergesicht mit schwarzem Keilfleck. [*limbata* Krb.]
Vorherrschend düstere, schwarzbraune und glanzlose Arten *P. interrupta* var.
11. Thorax zimtbraun mit 3 schwarzen Streifen. f mit schwarzem Ring. t -basis weissgelb 11.
Thorax schwarz. f mit Ausnahme der äussersten Spitze schwarzbraun. t -basis rotbraun. [*Krb.*]
..... *P. madagascariensis*
12. Halteren ganz gelb 12.
Halteren mit tiefschwarzer Spitzenhälfte. *P. acroschistus* Speis.
..... *P. halterata* Brun. und
[var. *congoënsis* Krb.]
13. Flügelbinde an der Mündung der 2. Längsader abgebrochen. Ein isolierter Spitzenfleck am Ende der 3. Längsader. Unterrand der 1. Hinterrandzelle und der Discalzelle je mit einem hyalinen Fleck. Haftläppchen braun. *P. ugandæ* Krb.
Flügelbinde bis zum Ende der Unterrandzelle reichend 14.
14. Fühlergriffel und Seitenfortsatz zwei kleine Knöpfe bildend, beide kürzer als breit .. *P. larvata* Speis.
Griffel und Seitenfortsatz stets länger als breit 15.
15. 1. Fühlerglied kaum doppelt so lang wie breit 16.
1. Fühlerglied mindestens 3–4 mal so lang wie breit. Griffel und Seitenfortsatz gleich lang 17.
16. Seitenfortsatz kaum halb so lang wie der Griffel. Zwischen Anal- und Discalzelle ein brauner Keilfleck. *P. digitata* Speis.
Endgriffel fast 3 mal so lang wie der Seitenfortsatz. Beide stäbchenförmig *P. cænostylus* Krb.

- | | |
|--|---------------------------------|
| 17. Die braunschwarze Flügelstrieme reicht nur bis zur <i>vena spuria</i> , der Raum dahinter ist glashell | 18. |
| Die braunschwarze Flügelstrieme reicht über die <i>vena spuria</i> hinaus bis an die Discalzelle | 20. |
| 18. Stirn oberhalb der Fühler mit einer kleinen quadratischen Grube | <i>P. frontalis</i> Szil. |
| Stirn ohne Grube | 19. |
| 19. Tarsen normal | <i>P. abyssinica</i> Krb. |
| Tarsen sehr lang behaart | <i>P. pilittarsis</i> Krb. |
| 20. Hüften tiefschwarz | 21. |
| Hüften rotgelb | 22. [(<i>nigrocoxa</i> Brun.). |
| 21. Kleine Querader normal | <i>P. ugandæ</i> Krb. |
| Kleine Querader stark reduziert | <i>P. pseudomicrovena</i> [Krb. |
| 22. Kleine Querader fast ganz reduziert | <i>P. microvena</i> Brun. |
| Kleine Querader normal | 23. |
| 23. Tarsen tiefschwarz | <i>P. pubescens</i> Brun. |
| Tarsen ganz rotbraun, eventuell das letzte Glied verdunkelt. 1. Tergit rotgelb ... | <i>P. ruficoxa</i> Krb. |

(To be continued.)

XXIX.—*Redescription of Periclimentes soror Nobili (Crustacea, Decapoda)*. By ISABELLA GORDON, D.Sc., Ph.D., Department of Zoology, British Museum (Natural History).

Periclimentes soror Nobili.

Nobili, 1904, Bull. Mus. Paris, no. 5, p. 231.

Nobili, 1906, Ann. Sci. Nat. Zool. (9) p. 50, pl. 2, fig. 6.

Material.—Sixty-five specimens, including many ovigerous females, found living in association with the starfish *Oreaster nodosus* (Linn.), were presented by F. C. E. Knight, Esq. Dr. Knight writes "They were mostly found close to the oral region but sometimes amongst the tube feet. I lost a lot of specimens as they fell off with the drips of water as the seastar was raised out of the water, and I could watch them swim away quite rapidly. Those I caught were stuck to the host by surface tension, but often flicked themselves free."

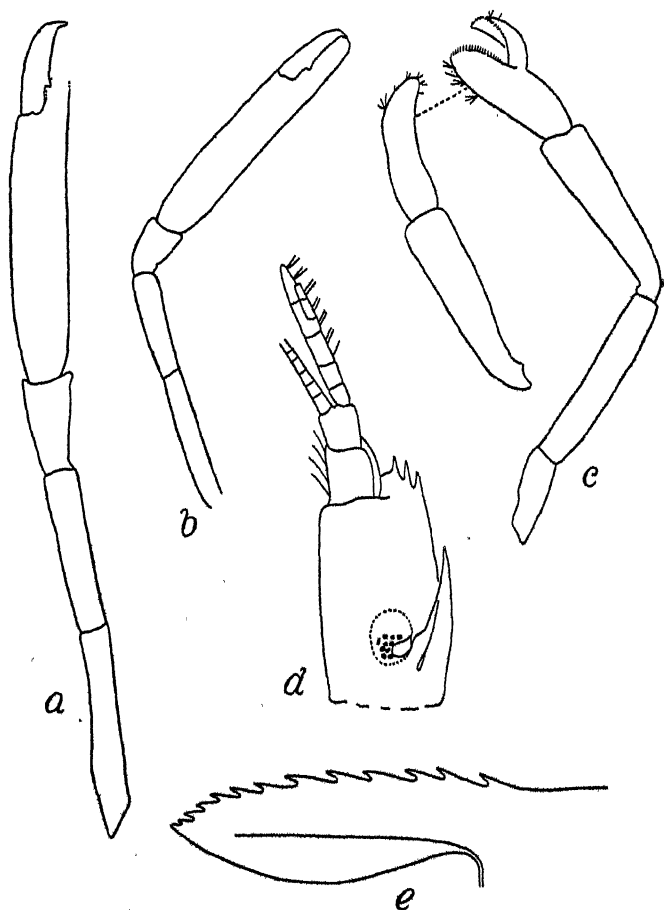
There appears to be only one previous record of a Pontoniid living in association with an Asteroid, namely *Periclimentes parasiticus* Borradaile on *Linckia* (Kemp, 1922, Rec. Ind. Mus. Calcutta, xxiv. p. 117).

Locality.—Inside coral reefs at low tide, Sanoer, South Coast of Bali.

Description of Female.

The *rostrum* reaches the distal end of the antennular peduncle in small, but is considerably longer in larger,

Fig. 1.

*Perilimenes soror* Nobili. Cotypes.

a and b. Larger second pereopod of two specimens of different size.

c. First pereopod. d. Antennule, $\times 28$. e. Rostrum.

specimens (fig. 3 c), extending almost to the apex of the antennal scale. It is deep in lateral view, especially in larger specimens (fig. 1 e), in small individuals the lower

border is less convex; the dorsal border is armed with 10-13 spinules, the first of which is situated on a level with, or rather in advance of, the posterior margin of the orbit.

The *eye* is robust; the distal (major) segment of the peduncle is almost as wide as long; the ocular spot is confluent with the cornea, which is hemispherical and a trifle narrower than the peduncle (fig. 3 c).

Antennule.—The peduncle is represented in figs. 1 d, 2 g; the lateral process or stylocerite reaches considerably beyond the middle of the basal segment; the anterior margin is greatly produced externally and is armed with two (occasionally three) spines*. The outer flagellum has 3-5 segments proximal to the bifurcation, according to the size of the specimen; the stouter inner branch appears to be composed of only two segments, but there may be a second suture near the apex, on a level with the distal pair of olfactory filaments (fig. 2 g). The statocyst contains a number of sand grains and is very conspicuous.

The *antennal scale* is more than twice as long as wide (approx. 2.33:1); the straight outer margin ends in a spine some distance behind the broadly rounded apex of the lamella (fig. 2 a).

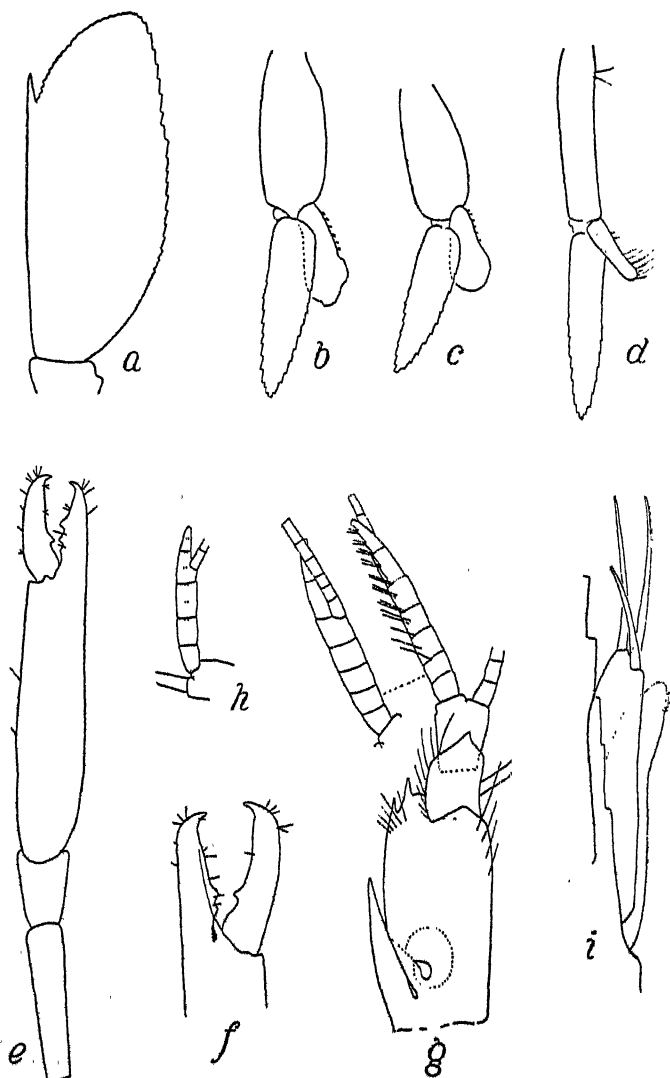
The *mandible* is very slender and deeply bifurcated, the incisor and molar processes being subequal (fig. 3 e); the exopodite of the third maxilliped extends to the middle of the second segment of the endopodite.

Peræopods.—The first pair are equal and reach almost to the apex of the antennal scale; the merus and carpus are subequal, and the latter is four (or three) times as long as its distal width (figs. 1 c, 3 d, d'). The fingers are equal to the palm, each is broadly spatulate, with the inner edge finely pectinate (fig. 1, c).

The second peræopods are markedly unequal (figs. 2 e and 3 a). The larger exceeds the antennal scale by at least half the length of the chela, which is almost six times as long as wide. In each the dactylus, which is rather less than one-half of the palm, is armed with a single tooth, which fits in between the first and second teeth on the immovable finger. The carpus, as a rule, is equal to the dactylus in the smaller, and considerably shorter in the larger, cheliped; sometimes

* Nobili only mentions one spine: "l'épine du premier article est courte," but see under remarks, p. 400.

Fig. 2.



Perichimenes soror Nobili. From Bali.

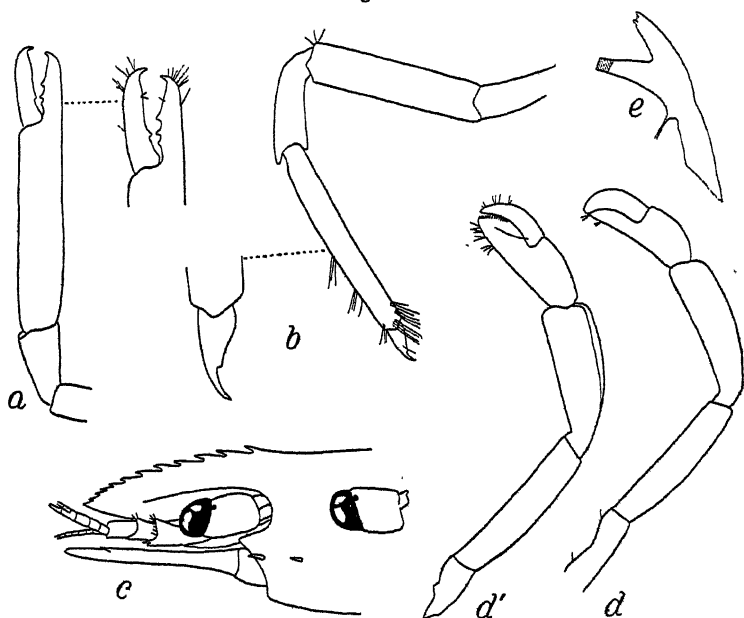
a. Antennal scale of ♀. b, c. First pleopod of two males differing in size. d. First pleopod of female. e. Larger second pereopod of female. f. Fingers of larger second pereopod of male. g. Antennule of male, ventral aspect. h. Outer flagellum of antennule of a smaller female. i. Appendix interna and appendix masculina of male.

a-h all $\times 28$.

the reverse condition is found (e. g., fig. 1 *a*). The merus is unarmed, and is a trifle shorter than the ischium.

The three posterior peræopods are slender; the third extends to the distal end of the second or third segment of the antennular peduncle *. The merus is unarmed at the distal end of the lower border; the propodus is seven times as long as wide and four-and-a-half times as long as the dactylus (fig. 3 *b*).

Fig. 3.



Periclimenes soror Nobili. From Bali.

- a*. Smaller second peræopod of female with fingers more highly magnified, $\times 28$ and 35 . *b*. Fifth peræopod of female, with dactylus more highly magnified, $\times 28$ and 35 . *c*. Anterior portion of carapace, $\times 9$. *d*, *d'*. First peræopod of female, $\times 28$. *e*. Mandible, $\times 45$.

The sixth *abdominal* somite is much longer than the fifth ($1.6-1.7:1$). The telson bears the usual two pairs of dorsal spinules, the first a little posterior to the middle, the second mid-way between the first pair and the apex.

Pleopods.—The anterior pleopods are rather longer and much more slender than those of the male (*cf.* figs. 2 *d*

* The length of the peræopods varies somewhat, according to the size of the specimen.

and 2 *b, c*); the endopodite of pleopod 1 is very slender and is provided with a group of long setæ on the distal half of the inner border.

Remarks.—The male is very similar to young and non-ovigerous females, but may be distinguished at once by the pleopods. The peduncle (protopodite) is much broader than that of the female (*cf.* figs. 2 *b-d*); the endopodite of pleopod 1 is much broader distally and the inner border is unarmed except for six minute setules on the proximal half. The appendix masculina on pleopod 2 is armed distally with three long setæ, as represented in fig. 2 *i*. The larger cheliped is similar to that of the female, but is somewhat more robust and may exceed the antennal scale by almost the entire chela; in the specimen figured the immovable finger has only two teeth on the inner margin, and the tooth on the dactylus fits in between them (fig. 2 *f*).

As Nobili's description is short and his figure rather poor, I thought it advisable to re-examine the cotypes for comparison with Dr. Knight's material. The cotypes, received on loan from the Paris Museum, are in poor condition and comprise three small specimens measuring 6.9–8.3 mm. in length, which are fairly complete although each has some appendages missing, two rather larger imperfect specimens and two much larger mutilated ovigerous females (length circa 14–15 mm.). Dr. Knight's specimens agree very well with the cotypes, and I think there can be no doubt as to their identity with *P. soror*. The only obvious difference is in the first peræopods, the carpus of which is frequently more inflated than in the cotypes (*cf.* figs. 1 *c* and 3 *d, d'*). Where this inflation is most marked there is a considerable space on one side between the chitin and the underlying tissues (fig. 3 *d'*), suggesting that it may be an artifact. The basal segment of the antennular peduncle represented in fig. 1 *d* has three spines on the anterior margin, but all the other cotypes have two, which appears to be the usual number. The outer flagellum is incomplete in most of the cotypes; I am not sure that my sketch is exact as to the number of segments (fig. 1 *d*). Unfortunately I omitted to examine the pleopods of the cotypes, and the imperfect condition of most of the specimens did not seem to warrant dissection of the mouth-parts.

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[ELEVENTH SERIES.]

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XXX.—*The Relation of the Tail-form in Cyclostomes and Fishes to Specific Gravity.* By A. J. GROVE, M.A., D.Sc., and G. E. NEWELL, B.Sc., Ph.D., Department of Zoology, Queen Mary College, University of London.

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I. INTRODUCTION.

From a study of the development of the tails of bony fishes Vogt (1842), Agassiz (1878 etc.), Huxley (1859), and others concluded that the ancestral tail was of the

protocercal (diphycercal) type; that this type of tail was succeeded at a later stage by the heterocercal type, which in turn gave way to the homocercal type (really an expression of extreme heterocercy, so as to form an externally symmetrical tail). In a few instances by reduction of the caudal skeleton a *truly* symmetrical tail—that is, symmetrical both externally and as regards its internal structure—is attained in the adult fish. To such a tail the term gephyrocercal is applied (*Fierasfer*, *Mola*), whilst a modification of the truly symmetrical tail is the isocercal tail characteristic of the modern Dipnoi.

Ryder (1886), however, postulated an archicercal tail which was merely a postanal extension of the body devoid of a fin-fold—a condition which occurs as the earliest stage in development of the tails of all fishes. This “archicercal” tail was held by Ryder to be the ancestral type, but would clearly only have assisted in the progression of a vermiform type of animal. The appearance in ontogeny and in evolution of a continuous fin-fold around the postanal region resulted in the attainment of the protocercal stage.

Ryder agrees with previous opinions as to the further evolutionary sequences of the types of tail, and advances the following suggestion for the change to heterocercy. The lower lobe grew more rapidly in size because its ventral position rendered it more effective as a sculling organ. During the side-to-side movement of the tail the lower lobe is alternately flexed in an oblique direction to the line of greatest resistance, with a result that there is a force acting on the tail which causes its axis to bend upwards.

Whitehouse (1910) gives a comprehensive account of the tails of Teleostomi and does much to clarify the terms relating to the morphology. In a later paper (1918) he suggests that the earliest fishes were bottom-dwellers possessing a true symmetrical (protocercal) tail which was merely the posterior end of the body provided with a continuous median fin-fold. Fishes of a later evolutionary stage had a heterocercal tail which had the effect of continuing the upward movement of the fish already initiated by a rearing up of the head region. This enabled the fish to reach the upper waters, and thus a change in habit was accompanied by a change in the form and

structure of the tail. At a still later stage the heterocercal type gave way to the homocercal type of tail, which Whitehouse regards as more efficient in that its skeletal supports are better adapted to withstand the stresses set up during swimming.

Ahlborn (1896) had put forward a mechanical explanation of the way in which a heterocercal tail functions, and was the first to state that the heterocercal tail raises the hinder end of the body. Further mechanical reasons for the development of a heterocercal tail were advanced by Schmalhausen (1912), who suggested that heterocercy was developed in part to increase the surface of the tail and consequently its efficiency as an organ of propulsion. Also that the change to the homocercal tail is accompanied by a shortening of the axis and a consequent increase in strength; the shape of the body having an effect on the form of the tail.

Breder (1926) revived Ahlborn's terminology for the heterocercal and symmetrical tails, viz., epibatic and isobatic. These terms refer to the function and not to the structure of the tails. The epibatic type has the effect of raising the tail region, the corresponding depression of the head being offset by an appropriate inclination of the paired fins, whilst the effect of the isobatic type is to drive the fish along quite horizontally. Although Breder's paper deals extremely fully with the mechanics of swimming, the invariable association of heterocercy with a heavy body seems to have escaped his notice.

In a previous paper (Grove and Newell, 1936) it was shown by means of models that the effective action of a heterocercal tail is to raise the hinder end of the fish and to assist in the forward movement of the body, whilst that of a homocercal or other type of symmetrical tail is to produce a forward drive alone. The effect of the heterocercal tail combined with the elevating of the head region by the inclination of the pectoral fins enables a fish heavier than water to swim clear of the bottom. Most fishes with a homocercal tail which swim freely have some form of hydrostatic mechanism by means of which their specific gravity is approximated to that of the surrounding water. From these facts it would appear that the important factor in determining the form of tail is the specific gravity of the fish relative

to that of the surrounding water, a point which does not seem to have been mentioned by previous observers. Moreover, if this be true, it is probable that the same factor is operative in determining the developmental succession leading up to the definitive tail in the Teleostomi.

This correlation is susceptible of experimental investigation, and it is the purpose of this paper to bring forward the results of experiments which support the suggestions outlined above.

II. MATERIAL.

Specimens of adult fish with representative types of tails and habits were easily obtainable, but the rearing of complete series of the developmental stages of Teleost larvæ proved exceptionally difficult.

It was evident at the outset that in dealing with a problem of this sort it was desirable to obtain data of the changes which occur in larvæ which develop from both pelagic and demersal eggs, and here at once serious difficulties were met with. Of the common marine Teleosts with pelagic eggs the only ones which could be obtained were those of the plaice, and these it was found practically impossible to rear in London under the conditions available. Nor was it possible to spend the requisite relatively extended period at a marine laboratory at the proper season. We were therefore compelled to confine our observations to the larvæ of freshwater fishes and series of trout (with demersal eggs) and of labyrinthine fishes (with pelagic eggs) were used.

Our thanks are due to Mr. C. T. Staples for valuable help and advice in the rearing of labyrinthine fishes.

III. METHODS.

The relative specific gravity of large adult fish is easily determined by means of Archimedes' Principle, there being only a small percentage error in the dry weight due to drying off or to water clinging to the surface. On the other hand, a large percentage error would be introduced in the method by the water clinging to the large relative surface of small larvæ. Further, it is important that the relative specific gravity of the *living* larvæ should be determined, because the delicate nature and the permeability of the skin renders them particularly

liable to *post mortem* changes if they are removed from their natural medium. Moreover, since it is often necessary to deal with individual larvæ the percentage experimental error in weighing would be appreciable, whilst the small differences in specific gravity that were anticipated would not be detected by any variety or application of Archimedes' Principle.

So far as we have been able to find out, the only published methods applicable are those of Ford (1929) and Lowndes (1938). Ford's method for herring larvæ was one of trial and error with a series of brines of known strength. The larvæ were assumed to have a specific gravity the same as that of the solution in which they neither floated nor sank. One grave objection to this method is that a single salt in solution always has some effect on the living semi-permeable membranes. Sodium chloride renders the membranes more permeable, so that substances can diffuse in and out of the tissues more readily, and the specific gravity of the larvæ would alter very rapidly. Lowndes states categorically that a flotation method is useless, and suggests an ingenious titration method, which, however, is not suitable for the present problem. For our purposes, then, what was needed was a method in which the experimental error, if present, was sufficiently constant to give reliable *relative* values if not absolute ones.

A modified and more accurate flotation method was therefore devised. This consisted essentially of the preparation of a standard solution in distilled water of a selected substance which had a higher specific gravity than the larvæ. A known volume of this solution was placed in a tube kept at constant temperature by means of a water-bath. Into this solution the narcotized larva was placed after first roughly drying it on filter-paper. Distilled water from a 25 c.c. burette was then slowly added until the larva just sank in the thoroughly mixed solution. The amount of water added was recorded. A second larva at the same stage of development was then placed in the same solution, and if it did not at once sink more water was added until this happened. The mean of the two dilutions was the figure taken.

It was at first thought that the differences in the amount of water added for different stages of development would

be an indication of differences in specific gravity, but this would only be true if the dilution curve (specific gravity against dilution) was a straight line. With certain substances the dilution curve is not a straight line, and to obtain the specific gravity (which in any case is still only relative) a dilution curve must be made. This curve was made by means of the usual specific gravity bottle method with the standard solution and with solutions of known dilution at the temperature at which the estimations on the larvæ were to be carried out.

The ideal substance would obviously be one which is non-toxic and whose presence in the surrounding fluid would not set up disturbances by osmosis or diffusion. It is obviously impossible to find such a substance, and the choice depended therefore on the following considerations :—

- (1) Since osmotic pressure depends on the number of gram-molecules per unit volume a non-toxic substance of high density is required.
- (2) The substance must be readily soluble in water.

The following substances were tried :—

- (a) *Cane sugar*.—This was abandoned because the results obtained were not consistent and because the standard solutions were liable to ferment.
- (b) *Common salt*.—Here the osmotic activity was too great, water being drawn out of the larva very rapidly, an effect which is increased by the effect of the single salt on the membranes.
- (c) *Sodium silicate*.—Although at first sight this appeared to have certain advantages, it was found that a standard solution which was nearly neutral was unstable and that the presence of sufficient sodium hydroxide to render it stable also made it very corrosive.
- (d) *Glycerin*.—This is relatively non-toxic, and, moreover, enters the tissues slowly, so that it gave constant results and apparently, in the dilutions used, in no way damaged the larvæ. The use of two specimens as outlined above reduced the error which may have arisen by the prolonged immersion of the first specimen.

An attempt to determine the accuracy of this method was made using Trout eggs. These eggs are relatively large, and are enclosed in a tough membrane, so that they could be dried safely on filter-paper, enabling a reasonably accurate determination of their dry weight to be made. Their specific gravity was arrived at by the specific gravity bottle method.

It was found that the specific gravity result obtained in this way differed by only 0.1 per cent. from that found by the glycerin flotation method.

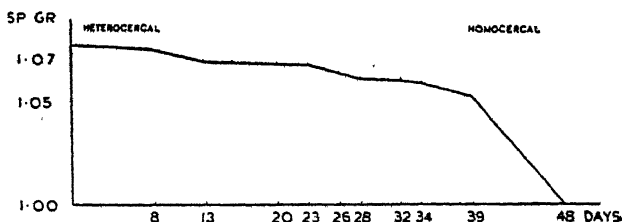
IV. OBSERVATIONS.

The data obtained from specific gravity determinations on Teleost larvæ are well shown by means of the following tables, from which the graphs given were drawn.

Rainbow Trout.

Age in days.	Length in mm.	Sp. gr.	Habits, condition of tail, etc.
0	12	1.076	Tail heterocercal; no fin-rays.
8	15	1.0745	Tail heterocercal; well-developed fin-rays in lower lobe. (Fig. 9.)
13	16	1.069	Lower lobe still larger.
20	21	1.068	Tail approaching homocercal condition.
23	21.5	1.0675	Tail still further advanced.
26	22	1.0635	Tail much the same.
28	22.5	1.0605	Tail has only a trace of heterocercy.
32	23	1.060	Tail as before; yolk-sac nearly absorbed.
34	25	1.0585	Tail still more nearly homocercal.
39	27	1.0525	Tail has attained definitive homocercal stage.
48	27	1.000	Adult facies.

Fig. 1.

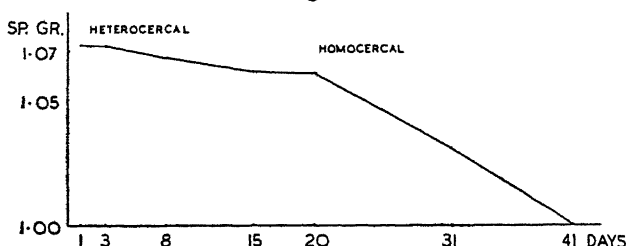


Graph showing the changes in specific gravity during the development of the larvæ of the Rainbow Trout.

Brown Trout.

Age in days.	Length in mm.	Sp. gr.	Habits, condition of tail, etc.
0	12	..	} Tail heterocercal as in Rainbow Trout.
1	12	1.072	
3	15	1.072	} Tail gradually changes through the heterocercal condition to the homocercal stage, the steps passed through much resembling those of the Rainbow Trout.
8	17.5	1.067	
15	20	1.061	
20	24	1.0607	
31	24	1.030	
41	24	1.000	

Fig. 2.

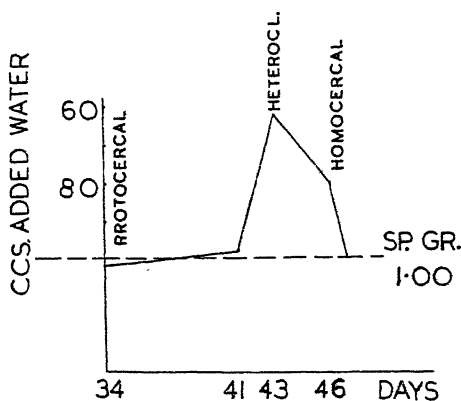


Graph showing the changes in specific gravity during the development of the larvæ of the Brown Trout.

Three-spot Gourami.

Age in days.	Length in mm.	Sp. gr.	Habits, condition of tail, etc.
0	..	>1.0	Floats on surface; tail protocercal.
14	..	>1.0	Still floats on surface; tail protocercal.
41	..	1.0+	Just sinks in water; heterocercy just evident as a slight upbending of the notochord; fin-rays in lower lobe only; specific gravity not capable of estimation.
43	..	1.0+	Tail heterocercal. Specific gravity still not estimated, but may be expressed as a dilution of 10 c.c. of standard solution, viz. 62 c.c. of water to 10 c.c. of standard glycerin solution.
46	..	1.0+	Tail approaching homocercal condition. Specific gravity expressed as dilution of 80 c.c. of water to 10 c.c. of standard glycerin solution.
47	..	1.0	Miniature adults with spot at base of tail, which is now homocercal.

Fig. 3.



Graph showing the changes in specific gravity during the development of the Three Spot Gourami (*Trichogaster trichopterus*). (Since the changes in specific gravity were so small they are indicated in terms of c.c. of water added to 10 c.c. of the standard solution.)

Betta splendens.

Batch 1.

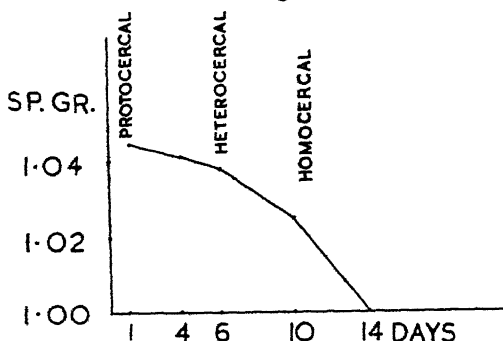
Age in days.	Length in mm.	Sp. gr.	Habits, condition of tail, etc.
0	Differences in length not easily measurable.	1.0405	Tail protocercal; larvæ rest on bottom.
1		1.047	Heterocercy just beginning; larvæ more active.
2		1.0405	Tail more advanced; larvæ still more active.
3		1.051	Little change visible; larvæ can now swim freely, but sink to the bottom when not swimming.
4		1.0495	Lower lobe relatively still larger.
5		1.0545	Heterocercy further advanced, but as yet no fin-rays in tail.
6		1.0565	Tail still heterocercal, but axis noticeably upturned; larvæ dart about rapidly to surface but still sink when tail stops beating.
7		1.036	Larvæ now only sink slowly in the water.

(Series unfinished because of *Saprolegnia* infection.)

Batch 2.

Age in days.	Length in mm.	Sp. gr.	Habits, condition of tail, etc.
1	..	1.045	As indicated for the previous batch.
4	..	1.0415	
6	..	1.0385	
10	..	1.025	Tail further advanced towards homocercy.
14	..	1.000	Tail homocercal.

Fig. 4.

Graph showing the changes in specific gravity during the development of the larvæ of *Betta splendens*.

From the graphs given and from the tables it will be seen that the newly hatched larvæ of the Rainbow Trout have a specific gravity of 1.076. This closely approximates to that of the eggs (1.077) as determined by the specific gravity bottle method. At this stage the larvæ have a length of 12 mm., with the type of heterocercal tail shown in fig. 5. There are no fin-rays, and the small larvæ are unable to rise from the bottom because of the large and heavy yolk-sac, which renders all their movements extremely eccentric. As development proceeds increase in length is accompanied by a strengthening of the tail through the acquisition of fin-rays in the lower lobe (fig. 9). The tail also changes in shape, for the lower lobe grows much more rapidly than the upper, whilst the upward bend of the notochord becomes more acute, so that a stage of extreme heterocercy (16 to 29 mm. in

length) is soon followed by the definitive homocercal tail (27 mm. in length) (figs. 6, 7, and 8).

As will also be seen from the tables these changes are accompanied by a gradual decrease in specific gravity

Fig. 5.

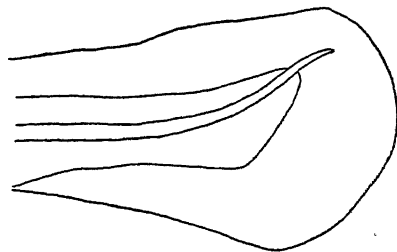


Fig. 6.

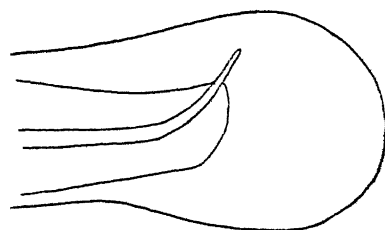


Fig. 7.

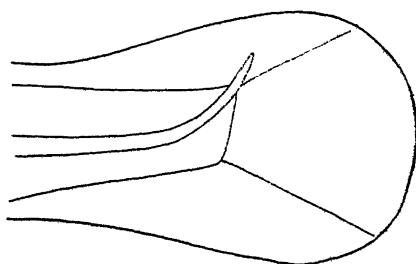


Fig. 5.—An outline drawing of the tail of a 13 mm. larva of the Rainbow Trout.

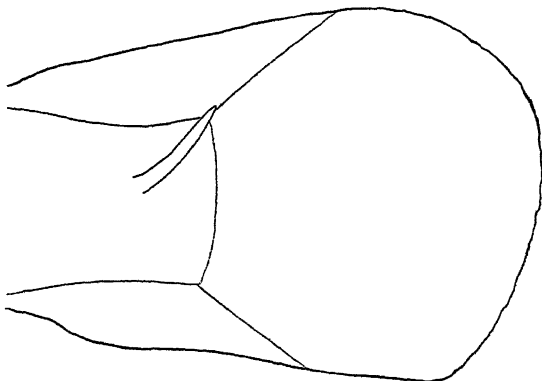
Fig. 6.—An outline drawing of the tail of a 16.5 mm. larva of the Rainbow Trout.

Fig. 7.—An outline drawing of the tail of a 19 mm. larva of the Rainbow Trout.

due to the using up of the heavy yolk, so that with the assumption of the homocercal type of tail the air-bladder

has become functional and the specific gravity of the miniature adult is the same as that of the surrounding water.

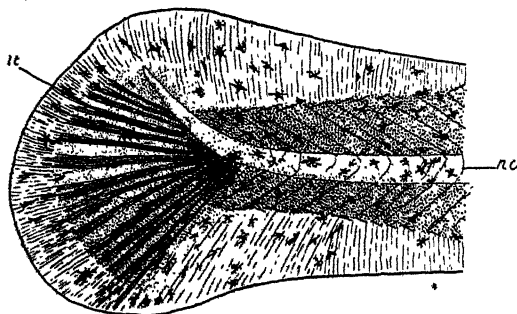
Fig. 8.



An outline drawing of the tail of a 22 mm. larva of the Rainbow Trout.

The same general results were obtained from observations on Brown Trout, the same correlation between specific gravity and type of tail being evident.

Fig. 9.



The tail of a 16.5 mm. larva of the Rainbow Trout.

ll=lepidotrichia (fin-rays), *nc*=notochord.

The Gourami results present a different picture. The eggs are minute and are pelagic, having a specific gravity

of less than 1. The minute, freshly-hatched larvæ have a protocercal tail and a similar specific gravity to that of the eggs, so that they also float at the surface. After about forty days, during which time the larvæ have increased in length and have developed a heterocercal tail, the specific gravity has risen, so that when not actually swimming (or when narcotized) the larvæ sink. It was impossible to record in actual figures the minute differences in specific gravity, but the changes were indicated by the different amounts of water required to dilute 10 c.c. of the standard solution of glycerin to produce a solution in which the larvæ just sank.

The change from the hetero- to the homocercal condition is surprisingly rapid, and is accompanied by a decrease in specific gravity, so that, when the adult facies are assumed, it is the same as that of the surrounding water.

Similar results were obtained with Paradise Fish (*Macropodus*). The minute, newly hatched larvæ have a protocercal tail. They are slightly heavier than water and rest quiescent on the bottom. With the assumption of the heterocercal condition of the tail they remain still heavier than the water in which they live, but become active, and when the homocercal stage is reached no difference in specific gravity between the larvæ and the surrounding water could be detected.

It was unfortunate that only one complete series of *Betta splendens* could be studied, because of the difficulties in rearing the larvæ. However, the results followed the same general plan as in other examples. The eggs are heavier than water, but are kept at the surface in the bubble-nest by the male. As would be expected the freshly hatched larvæ are also heavier than water. They have a protocercal tail, and normally they are buoyed up by the nest, to which they are returned by the male should they escape. The heterocercal stage is soon reached, and with its assumption the larvæ become more active. Throughout the persistence of the heterocercal stage the specific gravity remains greater than 1, but gradually decreases, so that it seems fair to assume that when the definitive tail is developed the specific gravity, as in other instances, would be that of the surrounding medium.

V. CONCLUSIONS.

The fundamental fact which is clearly brought out by the above experiments is that the type of tail is correlated with the relative specific gravity of the larvæ. In those cases where the relative specific gravity after hatching shows a gradual decrease then the sequence of tails is from hetero- to homocercal. Where the relative specific gravity shows a gradual increase and then decrease the sequence is from proto- through hetero- to homocercal. (It is this latter sequence which is usually quoted in support of a similar phylogenetic sequence on the grounds of "recapitulation.")

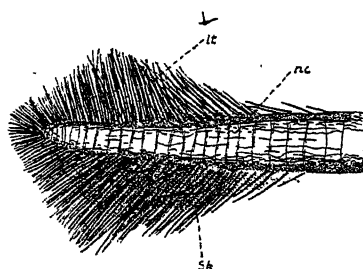
VI. DEVELOPMENTAL STAGES IN THE TELEOSTEI.

Whilst there are numerous excellent accounts of the development of the caudal fin of bony fishes, the authors have in almost all cases concentrated on the morphological aspect, and have neglected to mention changes occurring *pari passu* in other parts of the body. Facts relevant to the mode of life are (with a few noteworthy exceptions) omitted from these accounts, whilst papers dealing with the biological aspects of fish development rarely give any anatomical data at all. It has, therefore, been found almost impossible to find in the published accounts any exact information regarding the specific gravity of larval fishes and to correlate changes in the structure of the caudal fin with the development of other organs. Only a few quotations can therefore be made here.

(a) *Clupea harengus*.—The eggs of the Herring are demersal, but are not merely deposited on the bottom and left to the mercy of the currents, for they adhere to the substratum by a sticky secretion. In consequence of the high specific gravity of the yolk in the yolk-sac the newly hatched larva is heavier than sea-water and the tail is of the protocercal type (fig. 10). The larva lives on the bottom, from which it is unable to rise for the first few days (Holt, 1889). With the absorption of the yolk-sac and the development of the heterocercal tail (fig. 12) the larva is enabled to leave the bottom and ascend to the middle waters in search of food. Elevation of the anterior end of the body is

facilitated by the inclination of the facial region (fig. 13). These changes take place when the larva has attained a length of about 10 mm. At the 16 mm. stage the larva rises to the surface layers of the sea and the tail becomes still more markedly heterocercal, an effect which offsets

Fig. 10.

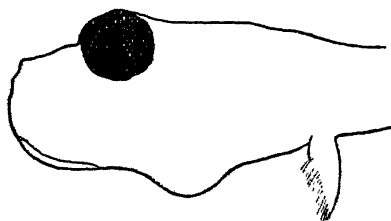


The tail of a 8.9 mm. larva of the Herring.

nc=notochord, *lt*=lepidotrichia (fin-rays), *sk*=skeletogenous tissue.

a probable increase in specific gravity due to the rudiments of the skeleton making their appearance. The change to the homocercal condition of tail coincides with the appearance of the swim-bladder, and presumably by this time the larva has some control over its specific gravity

Fig. 11.

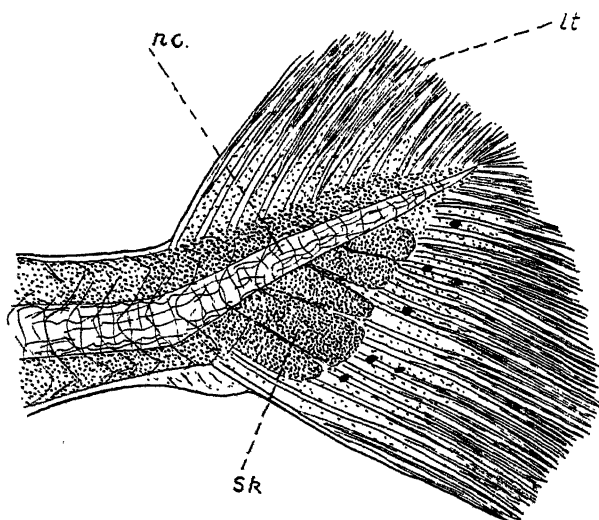


A side view of the head of a 8.9 mm. larva of the Herring.

and enters on an active pelagic life. The changes in specific gravity inferred for developing Herring larvæ have been partially confirmed experimentally by Ford (1929).

(b) *Ophiocephalus striatus*.—At first, owing to the presence of a yolk-sac of low specific gravity, the larva floats at the surface and swims there by means of a protocercal tail. With the appearance of the first rudiments of a skeleton at the 4·5 mm. stage the specific gravity of the larva tends to increase, but this is offset by the swim-bladder, which also makes its appearance at about this stage. The buoyancy of the air-bladder chiefly affects the anterior end of the larva, but with the absorption

Fig. 12.



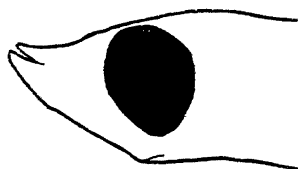
The tail of a 15 mm. larva of the Herring.

nc=notochord, *lt*=lepidotrichia (fin-rays), *sk*=skeletogenous tissue.

of the yolk-sac the tail becomes heterocercal, and by its action the posterior end of the body is also elevated. The pectoral fins become active at the 4·5 mm. stage, and the larva swims at varying levels, and towards the end of the larval period the tail becomes homocercal, and the miniature adults then live at the bottom of the stream. Presumably by this time the swim-bladder functions as a hydrostatic organ, so that the specific gravity of the fish is so adjusted that it lives with the minimum of effort in its new surroundings. The specific

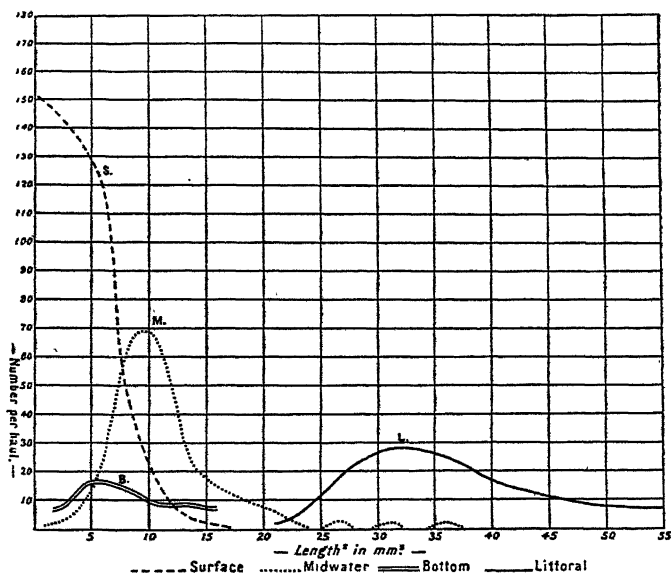
gravity is probably slightly greater than that of the water. (The facts given above, but not the interpretation, are from Willey, 1909.)

Fig. 13.



An outline drawing of a side view of the head of a 15 mm. larva of the Herring.

Fig. 14.



Graph showing the distribution of cod larvæ at varying depths in the sea (from Masterman, 1901).

(c) *Gadus morrhua*.—Masterman's account (1901) shows clearly that cod larvæ are found at levels which vary according to age and stage of development. The larvæ
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which hatch from pelagic eggs are, until the yolk-sac is used up at the 4.5 mm. stage, found abundantly in the surface layers. The tail is protocercal, and it is certain that the larvæ are lighter than sea-water. Stages of from 5 to about 24 mm. with heterocercal tails are found in the mid-waters, for because the buoyant yolk is used up and because the skeleton has begun to develop larvæ of this type are almost certainly heavier than sea-water. Young adults with homocercal tails are most abundant in the neighbourhood of the shore, but no data from which the relative specific gravity can be inferred are given by Masterman. The strong presumption is that the specific gravity of the miniature adults approximates to that of the water in which they live. The graph (fig. 14) shows the distribution of the larvæ at the different levels.

Again, so far as may be inferred from these published accounts the type of tail is correlated with the relative specific gravity.

VII. GENERAL STATEMENT OF A FUNCTIONAL EXPLANATION OF SO-CALLED RECAPITULATION SHOWN BY THE DEVELOPMENTAL SUCCESSION OF TELEOST TAILS.

From the above accounts of the development of certain Teleosts it is possible to make the general statement set out below. Teleosts with few exceptions lay eggs which float at the surface because the bulk of the yolk is in the form of oil. The early larvæ are therefore lighter than water, the yolk being included in the yolk-sac. At a variable time after hatching the skeleton develops, and the larva becoming heavier than water would sink away from the surface were it not for the fact that the tail enters on the heterocercal stage, and paired fins (in particular the pectorals) become prominent to assume the rôle of elevators. By these means the larvæ are enabled to remain swimming at the surface and to feed on those plankton organisms which form the bulk of the food of most Teleost larvæ. At a still later stage the swim-bladder becomes functional as a hydrostatic organ, and once again the larvæ tend to approximate

in specific gravity to the surrounding water. Correlated with the latter changes the heterocercy of the caudal fin becomes masked by the further development of the hypochordal lobe, so that secondary external symmetry or the homocercy of the definitive tail is reached, and it is used for forward propulsion alone.

Those fishes laying demersal eggs have early larvæ which are also heavier than the water in which they live. If the tail is protocercal the larvæ are confined to the bottom (*e. g.*, Herring) until the heterocercal tail makes its appearance, but some larvæ (Trout) are hatched with a heterocercal tail, and provided too much heavy yolk is not present, they may become active swimmers from the first. It may be safely concluded, therefore, that the succession of *larval* tails in the bony fishes is susceptible of a functional explanation, for it seems certain that each type of tail has some significance in the life of the larva, and is therefore in the nature of an adaptation to the particular life of the larva. If this is so, then the developmental stages are independent of phylogeny and are not evidence for a similar phylogenetic sequence. This is not to say that a similar phylogenetic sequence was not followed, but rather that in this, as in so many other instances, ontogeny in part resembles phylogeny, because the characters under consideration fulfil a similar function in the larvæ as they did in the adults of more primitive forms.

The occurrence of an *embryonic* protocercal stage may be regarded merely as incidental to larval life, and is probably a necessary prelude to the assumption of the heterocercal condition. If the protocercal condition occurs in the embryo before hatching no functional explanation can be attempted. It is to be noted that in the types here studied the protocercal tail is not structurally comparable to any known adult tail, in that skeletal elements (fin-rays, radials, etc.) are entirely absent, and these structures may be absent when the heterocercal form of tail has made its appearance.

In the light of these conclusions it will be interesting to examine (*a*) the form of the tail of living fishes in terms of environmental conditions, and (*b*) the possible phylogenetic sequence.

VIII. TAIL-FORM IN RELATION TO ENVIRONMENT.

(a) *Cyclostomata*.—There seems to be some uncertainty as to the actual form of the caudal fin of the living members of the *Cyclostomata*, for it is common to find the statement that the tail is of the protocercal or diphyccercal type. This statement is not strictly correct, for although the epichordal lobe is of approximately the same size as the hypochordal lobe, yet the notochord and the posterior end of the body in this region are not in the same straight line as the main axis of the body. In *Petromyzon fluviatilis* the posterior end of the body is quite sharply bent upwards in the tail region, but a curious contrast is noticeable in the structure of the tail of *Petromyzon marinus*. Here the axis of the tail is bent downwards. (Care was taken to examine the tails of living and freshly killed river lampreys, for specimens preserved in spirit frequently become so distorted that the body bends in a reverse direction to that found in living specimens. These distortions may, however, be detected by a puckering of the skin, and as it was found impossible to obtain living sea-lampreys or to get exact information as to the form of the tail in living specimens, the statement given, viz. that the axis of the tail is bent downwards, is based on observation of preserved specimens which showed no sign of distortion.)

The contrasting character of the tail in two creatures whose anatomy is otherwise almost identical calls for some explanation. It is likely that the difference is associated with the difference in specific gravity between salt and fresh water, for whereas, as the names imply, *P. fluviatilis* is an inhabitant of fresh water and *P. marinus* of the sea. It was found that, despite the presence of much oil in the tissues, *P. fluviatilis* is slightly heavier than fresh water, and specimens kept in the aquarium may usually be observed lying on their sides at the bottom of the tank. The upturning of the tail allows of a side-to-side flexure of the tail without the hypochordal lobe brushing the bottom, close to which the lamprey usually swims. As has been shown by the use of models (Grove and Newell, 1936) the effectual action of a tail with equal lobes and an upturned axis is to drive the tail end of the animal downwards and at the same time to drive the

animal forwards through the water. It is clear also that under these conditions during swimming the head region is also forced upwards. The significance, then, of this type of tail is that when the lamprey is adhering to stones by its buccal funnel slow lateral movements of the tail suffice to keep the posterior end of the body down near the bottom, whilst during active swimming, rapid upward movement, which is presumably necessary in the search for prey, will be facilitated. It was found that *P. fluviatilis* just floats in sea-water, and that the head floats at a higher level than does the tail region. Because of its similar anatomy it is reasonable to conclude that *P. marinus* floats in a similar manner. Bearing these points in mind, it seems that the downturned tail of the sea lamprey is an adaptation which enables the animal to swim parallel to the sea bottom, for during swimming, the tail drives the posterior end of the body upwards so that it tends to lie at the same level as the lighter anterior end. This effect may actually result in the head being forced downwards, and so enable a creature lighter than its surrounding medium to descend more easily to the bottom.

The lampreys do not seem to be unique among living Cyclostomes in having the axis of the tail inclined to the longitudinal axis of the body. A downturned axis of the tail is to be noticed in the illustrations of the Myxinoidea, which are also marine creatures.

From actual observations of *P. fluviatilis* it seems that *rapid* changes in the swimming level are brought about by flexures of the body in the vertical plane. Thus, if the animal wishes to rise rapidly, the anterior part of the body is bent upwards and the posterior part downwards. Diving movements are effected by flexures in the reverse manner. It is clear that vertical flexures of the body are possible only in animals which have a very flexible axial skeleton, such as is to be found in the modern Cyclostomes, where the notochord with its well-developed sheaths remains as the main axial skeleton throughout life. Nothing in the nature of vertebral centra are developed in relation to it, and the overlying spinal cord is protected merely by a somewhat irregular series of peg-like cartilages forming incomplete neural arches. In craniate classes other than the Cyclostomata, however,

the axial skeleton takes the form of a vertebral column which, although allowing of the wide lateral flexures necessary for swimming, prohibits, except in greatly elongated creatures, any but the smallest flexures in the vertical plane. Accordingly in most fishes rapid changes in swimming level are largely effected by the agency of the paired fins, which act in a way analogous to elevating planes. In eel-like fishes the paired fins tend to be reduced. In these forms the vertebral column, because of its greater length, acquires a greater measure of flexibility, and the same swimming conditions obtain as in *Petromyzon*.

The interesting conclusion which presents itself is this: that a flexible body is correlated with the absence or marked reduction in the size of the paired fins.

In the case of the Cyclostomata palaeontological evidence lends support to this view, for, as Stensiö (1927) and others have shown, the Ostracodermi are to be regarded as members of the Cyclostomata, mainly differing from the living members of the class in having a well-developed endoskeleton and exoskeleton. It is certain that the body of the Ostracoderms was far from being flexible, and it is interesting to note that in some (e. g., *Cephalaspis*) paired pectoral appendages were present, whilst in others (*Birkenia*) the presence of spines is some evidence for the existence of lateral fins. It is probable that during the evolution of the modern Cyclostomes reduction of the skeleton was accompanied by a corresponding reduction of the paired fins, so that their absence in present-day forms is a secondary condition.

(b) *Elasmobranchii*.—With few exceptions the heterocercal tail is found in all adult Elasmobranchs, and the larva hatches as a miniature adult from the large-yolked, demersal eggs. With this form of tail is associated the presence of large pectoral fins which act as elevators of the head region. An inclined snout is frequently present and acts as an additional elevator of the anterior part of the body. Most Elasmobranchs are heavier than sea-water, and by the arrangement of the fins and tail are enabled to swim clear of the bottom with the minimum of effort.

The degree of upturning of the axis of the tail varies with the form of the body. In elongated forms (Dogfishes, *Pristiurus*, *Chamydoselachus*, etc.) the axis is but

little upturned, whereas an increase in girth as compared with length is correlated with an increased upturning of the tail axis (e. g., *Cetorhinus*, *Lamna*, etc.). The upturning may be so marked that the form of the tail approximates to the homocercal condition. In *Torpedo* Whitehouse (1918) states that there exists a homocercy which, had it been found in the Teleostei, would not have been considered strange.

It has been pointed out previously (Grove and Newell, 1936) that the raising effect of the heterocercal tail is not due in any way to the inclination of the axis of the tail, but to the disparity in the size of the upper and lower lobes of the caudal fin. This disparity results in the upward component being greater than the downward component. It may be suggested, therefore, that the upturned axis of the heterocercal tail is a device which enables the tail as a whole to be brought approximately into symmetry with the main longitudinal axis of the body and so produce its forward thrust along this axis. Clearly, in elongated fishes, the lower lobe does not lie far below this longitudinal axis, and the axis of the tail is but little upturned. In fishes with a deeper body the lower lobe of the tail would lie well below the main axis of the body were it not for the marked upturning of the tail axis (fig. 15).

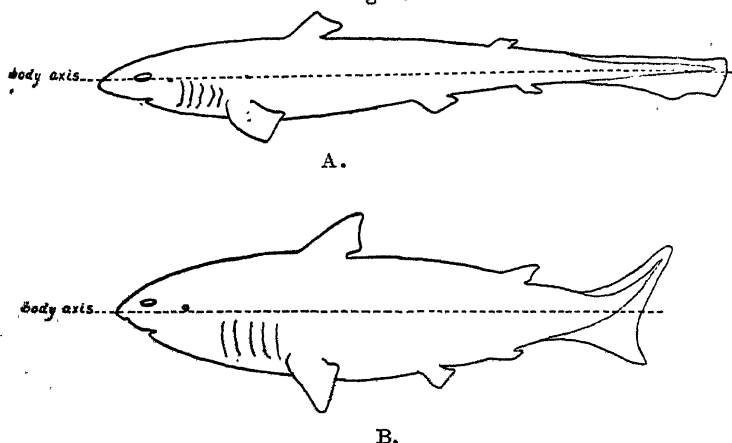
Variation in the form of the tail may be associated with habit. For example, the Basking Shark (*Cetorhinus*), because of the presence of large quantities of oil (150 gallons are said to have been obtained from a single fish!), can float at the surface of the sea; consequently in this instance the same conditions of relative specific gravity are found as in most Teleostei. It is therefore not surprising to find that, because of the sharply upturned axis, the tail functionally approaches the homocercal condition.

Torpedo is a heavily-bodied flattened fish living for the most part partially buried in the sea-floor. It is a sluggish swimmer, rarely rising into the upper waters, and consequently the forward drive which is alone produced by its homocercal tail suffices for its limited movements.

The interesting similarity in the general form of the body in the saw-fishes *Pristis* (Raiiformes) and *Pristiophorus* (Squaliformes), which both have a heterocercal tail, may perhaps be accounted for on the following

lines. In both, the development of the "saw" must make the head much heavier, and in order that this region may be raised from the bottom during swimming the pectoral fins are much enlarged, giving a ray-like form to the body of *Pristiophorus*, but in *Pristis* the large pectoral fins represent a reduced condition when compared with most Rays. This reduction (if it really is a secondary condition) would be a natural corollary of the re-establishment of a powerful heterocercal type of tail, for the fusion of the pectoral fins with the head which takes place in the Rays renders these fins ineffectual as elevators.

Fig. 15.



Outline drawings to show the relation of tail-fin to body axis in (A) the dogfish type and (B) the thick-bodied shark type of selachian fishes.

The enormous development of the pectoral fins and the reduction of the tail seen in the Rays is to be explained then by the fact that in these fishes the tail is not the main propulsive organ of the body, that function having been taken over by the "wings."

In the Holocephali similar tendencies are apparent.

(c) *Chondrostei*.—The Sturgeons and their allies have a body form and tails and fins similar to those typical of the Selachii, and their swimming habits are similar.

(d) *Polypterini*.—The paired fins are of the “crossopterygian” type, and although the tail is heterocercal it shows an approach to the homocercal condition. The body is heavier than water, but there is a well-developed air-bladder which lends buoyancy to the anterior part of the body, and so broad pectoral fins are not necessary.

(e) *Holostei*.—*Amia* and *Lepidosteus* have small paired fins and the tail is to all intents and purposes homocercal. Both are active swimmers, and it is presumed that the specific gravity is approximately the same as the water in which they live.

(f) *Teleostei*.—All Teleostei are characterized by the possession of a homocercal tail, but in a few instances (*Fierasfer*, *Mola*, etc.) extreme homocercy leads to a tail which is symmetrical both as regards its external appearance and its internal structure (gephyrocercal). In most, the air-bladder functions as an efficient hydrostatic organ and is capable of delicately adjusting the specific gravity of the fish to that of the surrounding water. The paired fins, are, as a rule, small and capable of very free movement, but as they are not primarily used as elevators they are variable in position and free to take on other functions, so that an extreme range of form is met with (*e. g.*, wings of Flying Fishes, etc.).

There are some interesting exceptions to the general statements made above; for example, the Mackerel (*Scomber*) and its allies are active pelagic fishes but are devoid of a swim-bladder. It is likely that the maintenance of a low specific gravity is due to the presence of oil in the body. The Flat-fishes (*Pleuronectidæ*) are heavier than water, and in the adults there is no swim-bladder. They are sluggish bottom-dwellers and the tail is not the main propulsive organ of the body. Swimming is chiefly carried out by the agency of the greatly extended dorsal and ventral fins. The pelagic larvæ of most *Pleuronectids* remain buoyant after the using up of the yolk (which is largely oil, and therefore lighter than water) by virtue of a swim-bladder which is lost at metamorphosis, after which the young adult settles down on the bottom.

Many other bottom-dwelling Teleosts are also heavier than water.

IX. PHYLOGENY.

The evidence given above from both experimental and observational sources has shown conclusively that the previously accepted phylogenetic sequence postulated from a recapitulation standpoint is not necessarily true. It remains therefore to consider what light fossil forms throw on this interesting problem.

Of all known Craniates the Ostracodermi exhibit the greatest number of primitive characters, and it is of prime importance that they are among the earliest Craniates to appear in geological time. The fact that the heterocercal tail is found with few exceptions in the Ostracoderms is some evidence for the supposition that this type of tail is ancestral to the other types met with in higher Craniates, and may have been inherited from a pre-Crinate ancestor. In this connection Graham-Smith (1939) says: "Among Devonian Agnatha are found both heterocercal and hypocercal types of tail; there is no morphological reason to suppose that either of these types is more primitive than the other, or that each has arisen from a protocercal type. The paired and anal fins seem to be much reduced and modified. In short, the known Devonian Agnatha seem to represent a number of different, quite specialised fin-arrangements, which probably originated from a more generalised fin-pattern, of unknown nature, at a period considerably earlier than the Devonian." In the absence of any palaeontological evidence showing intermediate forms between Ostracoderms and primitive Gnathostomes it seems safer to conclude that the Cyclostome and Gnathostome tails have been separately evolved. In this case it seems fair to assume that the type of tail found is a direct correlation with the habits of the creatures and connected with differences in habits and habitat. It is generally assumed that the Ostracoderms were benthonic forms, and clearly most were much heavier than water. In those forms where the heterocercal form of the tail is found it may be considered as fulfilling the same function that it does in other heavier-than-water fishes, but whilst the action of the hypocercal type must have been to depress the hinder end of the body the significance of this in the life of those Ostracoderms which possessed this form

of tail is not clear because of the lack of knowledge of their habits.

Most of the cartilaginous fishes found in Palæozoic strata possessed a heterocercal tail, and this is to be expected, as it is highly probable that they were heavier than the water in which they lived. As a rule the paired fins were broad and so arranged that they would act as elevators. Among the Elasmobranchii and their allies and other Palæozoic cartilaginous, fishes which have no modern representatives (Arthrodira, Antiarchi, etc.) the heterocercal tail would appear to be the primitive type. It is extremely interesting to find that Graham-Smith (1936), from a consideration of the relations of the finlets entering into the composition of the caudal fin to the point of termination of the lateral line, also arrives at the conclusion "that the heterocercal condition of the tail is the primitive one for all gnathostomes."

Three groups of bony fishes make their appearance in the Devonian. These groups are the Dipnoi, the Osteolepidoti, and the Paleoniscoidei, and although not universally present, the heterocercal condition of the tail is the typical one for all three groups. It is interesting to find that the paired fins are variable in form but are rarely broad and do not resemble the elevating type of fins of the Elasmobranchii. The most probable reason for this is that, as Watson (1925) has shown, an air-bladder which was primarily a lung was present at the anterior end dorsal to the gut, and would thus lend buoyancy to the head region, consequently making pectoral fins of the elevating type superfluous. Despite the presence of a lung it is likely that most of the early bony fishes were heavier than water, for an exoskeleton of ganoid scales and dermal bones was prominently developed. Throughout the Mesozoic and up to recent times a tendency to reduction of the skeleton is noticeable in all the groups of bony fishes; the dermal bones became reduced and the scales became thinner until in the Teleosts, *Amia* and the modern Dipnoi, nothing remains except a layer of thin, overlapping bony plates. Further, except in the Dipnoi, the air-bladder, which was primarily a lung, became in addition a hydrostatic organ, and it is this latter function alone which is retained in the more

highly evolved Teleosts. By these means the Teleosts became of approximately the same specific gravity as the water in which they lived, and at the same time the heterocercal gave way to the homocercal or gephyrocercal condition. The release of the paired fins from their rôle of elevators of the head region, by the lightening of the body and the adoption of the homocercal type of tail, allowed them to become free to evolve in other directions. The great diversity in position, size, and form of the paired fins of the Teleosts is an expression of this process.

That physical factors played a major part in determining the form of the tail is shown by the fact that the symmetrical condition is arrived at in different ways and in groups of fishes not closely related. Thus among modern bony fishes *Amia* has a homocercal tail comparable with that of most Teleosts, whilst the symmetrical tail of the Dipnoi is internally as well as externally symmetrical, and never passes through a heterocercal stage during development. As has been mentioned above, a true homocercal tail is also found in *Torpedo*.

The main arguments in favour of the supposition that the heterocercal type of tail is primitive for Craniates may be summarized as follows :—

1. The most primitive Craniates known, the Ostracodermi, had, with few exceptions, a heterocercal tail.
2. The heterocercal type of tail was typical of all groups of primitive Gnathostomes, and is generally found in the most primitive groups of living fishes.
3. The relations of the lateral line to the caudal finlets indicate that the heterocercal tail was primitive for Gnathostomes.
4. No adult fish either living or extinct has been found with a protocercal tail.

It follows that if the physical factors mentioned above are in reality the chief ones influencing the form of the tail then the widespread occurrence of the heterocercal condition is explained, and the attainment or approach to the homocercal or gephyrocercal condition in groups of fishes not closely related is also intelligible.

X. SUMMARY.

1. Observations on Teleost larvæ indicate that the form of the tail is correlated with the relative specific gravity and swimming habits.

2. A similar correlation can be inferred in living and extinct Cyclostomes and Fishes.

3. The paired fins are probably secondarily absent from modern Cyclostomes, and elongation of the body is correlated with the absence or reduction of the paired fins in both Cyclostomes and Fishes.

4. The larval succession of tails in the Bony Fishes is an adaptation to environmental conditions, and is not "recapitulatory."

5. The ancestral form of tail for Craniates was most probably the heterocercal type.

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XXXI.—*Descriptions and Figures of new South American Dryopidæ (Col.)*. By H. E. HINTON, Ph.D., Department of Entomology, British Museum (Natural History).

WHILE rearranging the collections of Dryopidæ in the British Museum, a new subspecies of *Dryops* and a new species of *Helichus* were found. In addition to describing these, the opportunity is taken of making known a closely related species of *Helichus* collected by the writer in French Guiana.

All drawings were made with the aid of a camera lucida. Lines next to figures refer to a length of 0.20 mm.

A key to the four South American species of *Helichus*, which have a well-developed sublateral sulcus on each side of the pronotum, is as follows :—

1. Species very small, 3.0 mm. or less. French Guiana *H. pusillus*, sp. n.
- Species large, 7.0–10.2 mm. 2.
2. Each elytron with a conspicuous oblique gibbosity near apex. British Guiana..... *H. gibbicollis*, sp. n.
- Elytra without gibbosities 3.
3. Disk of elytra with the striae punctures everywhere present. Surface of middle region of prosternal process with the punctures about a third coarser than those of head and seldom separated by as much as one diameter but often confluent. Males with the polished and gibbous line of middle ventral side of front trochanter curved; posterior side of middle trochanter evenly convex; and apex of median lobe of genitalia without spines. French Guiana *H. frater* Hinton.
- Disk of elytra with the striae punctures absent in first two striae. Surface of middle region of prosternal process with the punctures finer than those of head and contiguous to separated by three diameters. Males with

the polished and gibbous line of front trochanter straight; posterior side of middle trochanter strongly gibbous; and apex of lobe of genitalia with an acute spine on each side. French Guiana

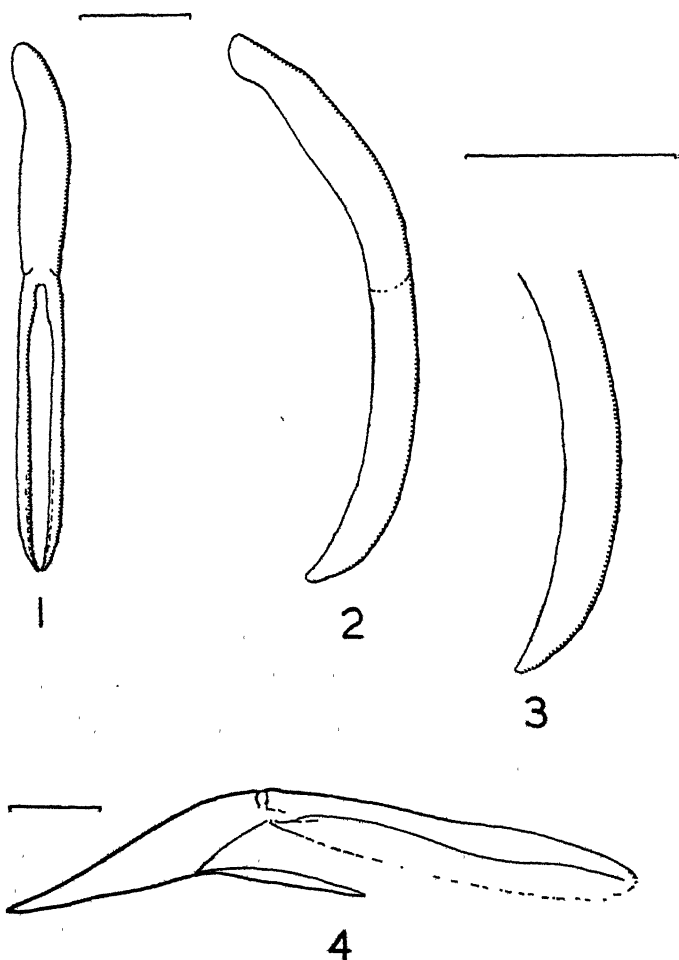
H. hollowi Hinton.

Helichus pusillus, sp. n. (Figs. 1-4.)

Male.—Length 2.5–3.0 mm.; breadth 0.98–1.17 mm.

Cuticle shining, brownish to blackish rufo-piceous; antennæ, mouth-parts, legs, and ventral surface paler. *Head* without distinct impressions; surface with two sizes of round punctures as follows:—(1) coarse punctures as coarse as facets of eyes or slightly coarser, deep, and usually separated by one to two diameters; and (2) fine punctures about a third as coarse and denser; from each coarse puncture arises a brownish-testaceous, long, erect hair, and from each fine puncture a similar hair which is only half as long and usually recumbent. Clypeus with fronto-clypeal suture straight and about 0.07 mm. long; anterior margin shallowly, broadly, arcuately emarginate, and angle on each side broadly rounded; surface sculptured somewhat like anterior part of head. Labrum with anterior margin broadly, shallowly, arcuately emarginate, and angle on each side broadly rounded; surface sculptured like that of clypeus, but with anterior middle region glabrous and nearly impunctate. *Pronotum* across broadest point, which is at base, broader than long (0.87 mm.: 0.68 mm.) and base broader than apex (0.87 mm.: 0.57 mm.). Sublateral sulcus present on basal fourth (0.19 mm. long). Lateral margin smooth. Surface sculptured like head but with coarse punctures slightly coarser. *Elytra* three times as long as pronotum (1.97 mm.: 0.68 mm.), and broadest point, at about apical third (2.5 mm. broad), slightly broader than broadest point across humeri. Lateral margins smooth. Apices broadly and conjointly rounded. Striæ coarse, feebly impressed, but everywhere present; stria punctures present in all striæ, deep, usually round, a half to two-thirds as coarse as intervals, and separated longitudinally by less than one diameter. Intervals flat and moderately densely and very finely punctate. *Scutellum* flat, subovate, broader than long, and punctate as adjacent elytral intervals. *Prosternum* with process long and acute, but with apex of process broadly rounded;

surface of process and elsewhere on prosternum punctate like pronotum. Hypomera sculptured like prosternum.



Helichus pusillus, sp. n.

- (1) Dorsal view of male genitalia. (2) Lateral view of same. (3) Left lateral view of apex of median lobe of same. (4) Lateral view of female genitalia.

but with the coarse punctures frequently replaced by granules. Metasternum with median longitudinal line.

fine and complete; surface punctate like pronotum but slightly more sparsely so; sides more densely and coarsely punctate than disk. *Abdomen* with apical margin of fifth sternite shallowly and arcuately emarginate at middle; extending anteriorly from this emargination to anterior third is a feebly convex median callosity. Surface punctate like metasternum. *Genitalia* as figured (figs. 1-3).

Female.—Externally similar to male. Usually slightly larger (3.0 mm. : 2.5 mm.). *Genitalia* as figured (fig. 4).

Type.—A male in the collection of the British Museum (Nat. Hist.). French Guiana: St. Laurent du Maroni, x. 1937 (*H. E. Hinton*).

Paratypes.—One male and seven females with same data as type.

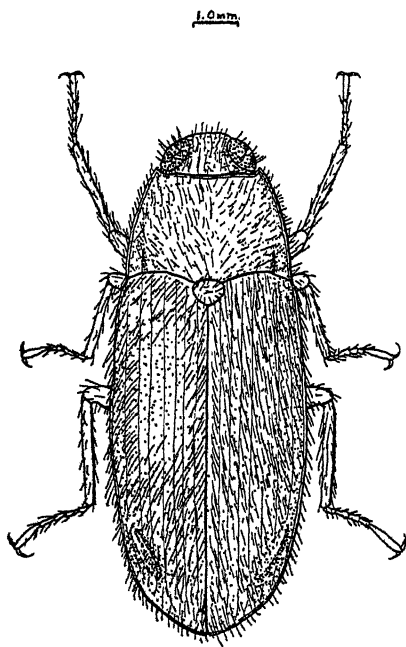
Comparative Notes.—From all other species possessing a sublateral sulcus on the pronotum, it may be immediately distinguished by its very small size (2.5-3.0 mm. : 7.0-10.2 mm.) and differently formed male genitalia.

Helichus gibbicollis, sp. n. (Figs. 5-7.)

Female.—Length 10.2 mm.; breadth 3.8 mm.

Cuticle shining and rufo-piceous. *Head* without distinct impressions; surface with two sizes of round punctures as follows:—(1) coarse punctures slightly finer than facets of eyes or 0.023 mm. broad, usually separated by a third to one diameter, though absent on a very feebly developed median longitudinal callosity opposite posterior third of eyes; and (2) fine punctures which are a third to half as coarse and are usually separated by one to two diameters; from each coarse puncture arises a fine, erect, dark brown (in some lights feebly testaceous) hair which is about 0.20 mm. long, and from each fine puncture a brownish-testaceous, recumbent hair which is only about half as long. Clypeus with the fronto-clypeal suture shallow, straight, and between antennæ 0.19 mm. long; anterior margin with middle feebly rounded and on each side broadly, arcuately, and very shallowly emarginate; anterior angles obtusely rounded; surface sculptured like that of head but more densely and slightly more finely so. Labrum with anterior margin feebly rounded, truncate at middle, with angle

on each side broadly rounded; surface punctate like that of clypeus, but with anterior middle portion glabrous, polished, and nearly impunctate. *Pronotum* across broadest point, which is at base, broader than long (3.1 mm.: 2.13 mm.), and base broader than apex (3.1 mm.: 1.97 mm.). Sublateral sulcus present on basal

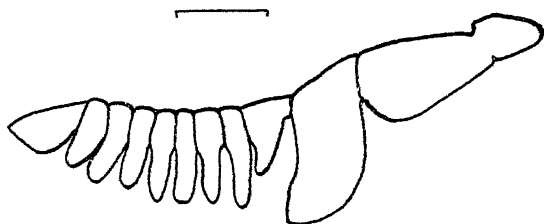


5

Helichus gibbicollis, sp. n.

fourth (0.41 mm. long). Lateral margins smooth. Surface sculptured like head, but with coarse punctures very slightly coarser. *Elytra* more than three times as long as pronotum (7.0 mm.: 2.13 mm.) and with broadest point (3.8 mm.), at about apical two-fifths, slightly broader than broadest point across humeri. Lateral margins smooth. Apices broadly and conjointly

rounded. Striæ very feeble but distinct; stria punctures always indistinct, absent near apex, and on disk usually round, 0.03 mm. broad, and separated longitudinally by three to five diameters. Intervals flat except near apex where there is a well-developed gibbosity extending posteriorly and inwards across eighth, seventh, sixth, and fifth intervals; surface of intervals sculptured like pronotum but very slightly more finely and sparsely so. *Scutellum* flat, broader than long (0.73 mm. : 0.46 mm.), base feebly rounded at middle and elsewhere nearly truncate, and sides arcuately converging to apex which is acutely rounded; surface sculptured as adjacent elytral intervals. *Prosternum* with process long and acute;

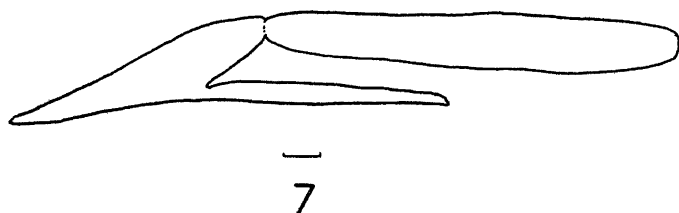


6

Helichus gibbicollis, sp. n. Antennæ of female.

near apex of process with a broad longitudinal gibbosity which is about 0.21 mm. long and on top is very narrow, almost carinate; surface of process sculptured like that of elytral intervals but with the coarse punctures sparser; prosternum anteriorly more densely punctate than process and towards sides with the coarse punctures becoming slightly coarser and fine punctures much denser. Hypomera sculptured like sides of prosternum but with the coarse punctures frequently, except in middle region, replaced by round granules, which are nearly as large and are similar in density to punctures they replace. Mesosternum triangularly and very broadly and deeply, arcuately emarginate; surface sculptured like prosternal process. Metasternum with median longitudinal line

feebly impressed, basally 0.027 mm. broad, anteriorly narrower and traceable to anterior margin; disk feebly depressed on middle at posterior half; surface sculptured like prosternal process but more regularly and densely so; sides of metasternum with coarse punctures all replaced by fine, round, low granules. *Abdomen* with apical margin of fifth sternite deeply, narrowly, and triangularly emarginate; from apex of emargination a narrow and feebly elevated callosity extends posteriorly for 0.87 mm. Surface of sternites at middle punctate, somewhat like metasternal disk and at sides with the punctures replaced by low, round granules which on first and second sternites



Helichus gibbicollis, sp. n. Genitalia of female.

are rather dense, being frequently separated by less than one diameter.

Type.—A female in the collection of the British Museum (Nat. Hist.). British Guiana: Essequibo River, Moraballi Creek, 15. x. 1929 (*Oxf. Univ. Expedition*).

Comparative Notes.—This species can only be compared to *H. frater* Hinton and *H. bollowi* Hinton, but from both of these may be immediately distinguished by the large apical gibbosity on each elytron.

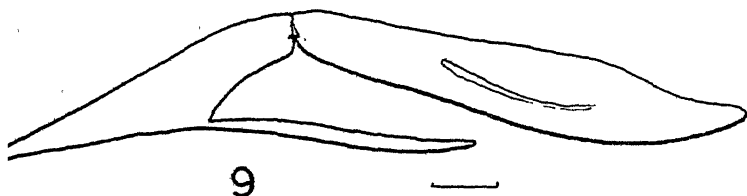
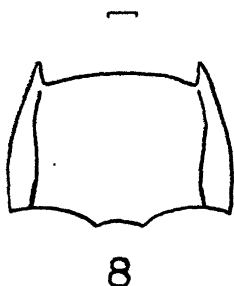
Dryops cribratus chilensis, subsp. n. (Figs. 8–9.)

Female.—Length 5.5–6.0 mm.; breadth 2.4–2.5 mm.

Body very feebly obovate, strongly convex. Dorsal surface clothed with long (about 0.32 mm.), erect, moderately dense, blackish hairs, and also moderately densely clothed with much shorter (about 0.13 mm.), usually recumbent, paler hairs; ventral surface similarly clothed but with long hairs shorter, paler, and less erect

so that distinction between two types is less evident. Cuticle shining and rufo-piceous, with apical segments of antennæ and mouth-parts paler. *Head* without distinct impressions; surface with two sizes of punctures as follows:—(1) coarse punctures about half again as broad as facets of eyes or 0.04 mm. and contiguous to separated by one diameter, though on middle of head slightly finer and sparser; and (2) fine punctures which are about 0.014 mm. broad and are usually separated by less than to one diameter. Clypeus with fronto-clypeal suture obsolete, between antennæ 0.19 mm. long; anterior margin broadly, shallowly, and arcuately emarginate for its entire breadth, with angle on each side obtusely rounded; surface sculptured like middle of head, but with coarse punctures denser and slightly finer. Labrum with anterior margin at middle feebly and arcuately emarginate, nearly truncate, and angle on each side broadly rounded; surface anteriorly polished and nearly smooth. *Pronotum* across broadest point, which is at basal third, a third broader than long (2.00 mm. : 1.31 mm.) and base broader than apex (1.94 mm. : 1.34 mm.). Shape as shown in fig. 8; sublateral sulcus very deep on basal third; surface without coarse punctures on a narrow (about 0.027–0.050 mm.) and complete median longitudinal line, but elsewhere sculptured like head. *Elytra* three times as long as pronotum (4.0 mm. : 1.3 mm.) and broadest point, which is about at apical third, broader than broadest point across humeri (2.4 mm. : 2.0 mm.). Humeri not gibbous, elytra evenly convex here. Apices very shortly, feebly, and acutely produced. Lateral margins smooth, under high magnifications feebly and irregularly crenate. Surface with the sutural stria feebly impressed on basal half, elsewhere without striæ and with punctures only indistinctly arranged in rows, round to irregular, deep, 0.04–0.07 mm. broad, and confluent to separated by one diameter; surface between these punctures highly polished and with an occasional microscopic puncture. *Scutellum* flat, broader than long (0.41 mm. : 0.24 mm.), and subovate with base nearly truncate; surface with fine punctures dense and coarse punctures not as coarse as facets of eyes and separated by two diameters. *Prosternum* with the process acute; surface of process with very deep punctures similar

in size to those of head but frequently confluent and seldom separated by as much as one diameter; punctures elsewhere on surface sparser and not so deep. Hypomera with the coarse punctures replaced by round granules which are separated by one to two diameters. Metasternum feebly depressed along middle, with median longitudinal line complete and narrow, and with surface



Dryops cribratus chilensis, subsp. n.

(8) Dorsal view of pronotum to show shape and extent of sublateral sulci. (9) Lateral view of female genitalia.

punctate as sides of pronotum; sides of metasternum extremely densely asperate, more deeply, sparsely and slightly more finely punctate than metasternal disk. *Abdomen* punctate like prosternum but with sides of first sternite more densely and coarsely so; fifth sternite near apical middle margin feebly gibbous. *Genitalia* as figured (fig. 9).

Type.—A female in the collection of the British Museum (Nat. Hist.). Chili.

Paratype.—A female with same data as type. This specimen has the humeri feebly but distinctly gibbous.

Comparative Notes.—This is the first species of *Dryops* to be recorded from Chili. From the typical form of *D. cribratus* Grouv. of Brazil, it may be distinguished by its smaller size (5·5–6·0 mm. : 7·0–8·0 mm.), proportionally broader body, and rufo-piceous instead of black colour.

XXXII.—Some new Races of Birds from Mexico.

By A. J. VAN ROSSEM.

THE races of birds here described from western Mexico have been known to the writer for some time, but the formal application of names has been delayed pending examination of confirmatory material. More detailed discussion of the questions involved will appear later in a general systematic work on the birds of Sonora, Mexico, the manuscript of which is complete save for minor details, and which will be published during the coming year. The preliminary diagnoses are as follows:—

Anhinga anhinga minima, subsp. n.

Type.—Male adult, 157356 Biological Survey Collection, U.S. National Museum; collected at Acaponeta, Nayarit, Mexico, on June 24, 1897, by E. W. Nelson and E. A. Goldman.

Subspecific characters.—Smallest of the races of *Anhinga anhinga* (Linn.). Differs from typical *anhinga* of South America in much smaller size and in paler and more greyish (less buffy) tipping to the rectrices.

Range.—Pacific coast of Mexico and Central America from Sinaloa (Mazatlan) south to El Salvador. Accidental in western Texas (Langtry, Biol. Survey Coll.).

Remarks.—Inclusion of all the *Anhingas* of North and South America under one name is quite impossible, and I can attribute such inclusion only to the fact that no one seems to have given the matter any consideration. Briefly, the large typical race *anhinga* Linnaeus (Brazil) ranges from South America north to western Panama.

An equally large race, though with smaller bill and greyer (less buffy) tail tipping, ranges from Costa Rica and Nicaragua (both coasts) northward through eastern Mexico to the south-eastern United States. For this race the name of *leucogaster* Vieillot (Florida) is available. The small race *minima* here described is confined to the Pacific coast from El Salvador northward.

Specimens examined.—*anhinga*, 25 from British Guiana, Argentina, Paraguay, Brazil, Ecuador, Colombia, Venezuela, and Panama (north to Veraguas): *leucogaster*, 49 from Costa Rica, Nicaragua, Guatemala (east coast), Mexico (east coast), Florida, Alabama, South Carolina, Georgia, Louisiana, Texas (south-eastern), Michigan: *minima*, 18 from El Salvador, Guatemala (west coast), Chiapas, Oaxaca, Guerrero, Michoacan, Colima, Nayarit, Sinaloa, western Texas (Langtry).

Measurements of adult males in millimetres.

	Wing.	Tail.	Culmen.
11 <i>anhinga</i>	320-355	230-265	90-97 (93.2)
20 <i>leucogaster</i>	320-343	235-260	77-87 (82.4)
7 <i>minima</i>	295-320	218-240	67-77 (72.0)

Buteo magnirostris xantusi, subsp. n.

Type.—Male immature, 30233 U.S. National Museum; collected at Rio Armenia, Colima, Mexico, in February, 1863, by John Xantus.

Subspecific characters.—Resembles *Buteo magnirostris griseocauda* (Ridgway), of eastern Mexico, in complete absence of red in the tail-bands, but differs in the almost complete elimination of red from the wing-feathers, darker dorsal coloration, darker and more brownish (less reddish) ventral coloration and larger size.

Range.—Western Mexico, from Colima (Rio Armenia) south to Guerrero (Acapulco).

Remarks.—Six specimens of *xantusi* have been examined from the range give above, three immatures in the collections of the United States National Museum and three, two adults and an immature, in the British Museum. Measurements of the type are: wing 250; tail 172; culmen from cere 20.5; tarsus 68; middle toe minus claw 32 mm. Measurements of the other five specimens (three females and two not sexed) closely approach these figures.

Polyborus cheriway ammophilus, subsp. n.

Type.—Male adult, 30467 a Dickey Collection, California Institute of Technology; collected at Tesia, Sonora, Mexico, on March 27, 1930, by J. T. Wright.

Subspecific characters.—Differs from *Polyborus cheriway auduboni* Cassin, of Florida, in generally smaller size (particularly bill, tarsi, and feet) and in more prominently barred tail.

Range.—North-western Mexico in the States of Sonora, Sinaloa, and Nayarit and the Territory of Baja California, north into southern Arizona.

Remarks.—Typical *auduboni* is confined to Florida. How to treat the Caracaras of Mexico in general is undecided at the moment. However, several geographical trends are readily observable: north-eastern Mexico and Texas birds are variously intermediate between *auduboni* and *ammophilus*; south-western Mexico birds are the largest of all, though with the smaller bill and strongly barred tail of *ammophilus*. My impression at this time is to consider all Mexican and Texas birds as *ammophilus*, but this may be altered by examination of subsequent material. To date 97 Caracaras have been examined from localities ranging from northern Central America to Arizona, Texas, and Florida.

*Measurements of adult males in millimetres.*13 *auduboni* from Florida.

Wing.	Tail.	Culmen.	Depth at cere.	Tarsus.	Middle toe minus claw.
380-410	200-225	31-36	22-25	92-102	50-53

15 *ammophilus* from north-western Mexico and Arizona.

Wing.	Tail.	Culmen.	Depth at cere.	Tarsus.	Middle toe minus claw.
370-387	197-210	30-32	20-22	88-93	48-51

Brachyramphus hypoleucus pontilis, subsp. n.

Type.—Breeding male adult, 22963 Carnegie Museum; collected on the San Benito Islands off central Baja California, Mexico, on March 29, 1897, by A. W. Anthony.

Subspecific characters.—Most closely resembling *Brachyramphus hypoleucus scrippsæ* (Green and Arnold), of the islands off the coast of southern California and northern

Baja California, but differing in having the inner webs of the outer primaries with a light brown area next to the shaft; neck outline between dorsal and ventral areas very close to that of *Brachyramphus hypoleucus craveri* (Salvadori); bill shape intermediate between *scrippsæ* and *craveri*, but perhaps closer to the former.

Range.—Breeds on the San Benito Islands off the Pacific coast of central Baja California. Occurs also (not breeding) along the adjacent mainland (Port San Bartolomé).

Remarks.—Years ago ('Condor,' xvii. 1915, pp. 74-76; *ibid.*, xxviii. 1926, pp. 80-83) I stated flatly that no such thing as intergradation between *hypoleucus* and *craveri* was likely, and that the two were specifically distinct. Statements of this nature are always hazardous and the present case offers a good (or bad) example. The breeding race of the San Benito Islands (eight specimens in the Carnegie Museum; one specimen in the University of Michigan; one specimen in the Dickey collection) is, just as its name implies, an intermediate, and there is no longer the slightest reason to consider the two supposed species as other than geographic races. Further evidence of intergradation is provided by a specimen of unknown sex (22965 Carnegie Museum), taken by A. W. Anthony on Natividad Island on April 9, 1897. This individual is exactly intermediate in all particulars, including a slight degree of dusky mottling on the under wing-coverts. Short of a series from Natividad I do not attempt to place it subspecifically.

The breeding-ranges of the several races may be given as follows on the basis of present information:—

Brachyramphus hypoleucus scrippsæ (Green and Arnold).

Santa Barbara Islands, off the coast of southern California, south to Los Coronados Islands, Baja California, Mexico.

Brachyramphus hypoleucus hypoleucus Xantus.

Guadalupe Island, off Baja California, Mexico.

Brachyramphus hypoleucus pontilis van Rossem.

San Benito Islands, off central Baja California, Mexico.

Brachyramphus hypoleucus craveri (Salvadori).

Islands in the Gulf of California, Mexico.

Ptychoramphus aleuticus australis, subsp. n.

Type.—Breeding male adult, 50841 Dickey Collection, California Institute of Technology; collected on West San Benito Island, Baja California, Mexico, on February 2, 1932, by A. J. van Rossem.

Subspecific characters.—Similar to *Ptychoramphus aleuticus aleuticus* (Pallas) of Alaska, to northern Baja California, but size smaller.

Range.—San Benito Islands south to San Roque Island, Baja California, Mexico.

Remarks.—When a cruising party of naturalists, of which I was a member, stopped for a day at the San Benito Islands in order to collect examples of the several birds peculiar to the locality, I was surprised to find these little Auklets breeding abundantly at a date two months in advance of the time when one could expect the first eggs on the islands off the coast of southern California. Beyond observing at the time that the eggs seemed remarkably small, I thought nothing more of the matter, but prepared four skins simply as locality representatives. Later comparison showed them to be quite distinct from typical *aleuticus*, but with only four specimens to go on nothing was done at the time. Recently Dr. Burt of the University of Michigan stopped at the same islands and collected four additional specimens, two males and two females, which show the same small size. Also, two specimens from San Roque Island in the Natural History Museum at San Diego, California, exhibit the same characters.

As to *aleuticus*, I can detect no variation over the immense range from Alaska to northern Baja California, save that specimens from San Geronimo and San Martin Islands are extremely variable in size, and seem to mark the region of transition from *aleuticus* to *australis*.

Measurements of adult males in millimetres.

	Wing.	Culmen.	Tarsus.	Middle toe minus claw.
8 <i>australis</i> ...	110-115	17.1-18.9	22.9-23.5	23.5-25.2
48 <i>aleuticus</i> ...	118-128	18.5-20.2	24.3-26.7	26.0-29.2

XXXIII.—*Notes on Solifugæ (Arachnida)*.—I. Galeodidæ.

By R. J. WHITTICK, B.Sc., Department of Zoology,
British Museum (Natural History).

THE collection of Solifugæ in the British Museum (Natural History) is being revised in the light of Professor Roewer's recent monograph on the group in Bronn's 'Tierreich,' and the Galeodidæ have now been examined. Most of the collection calls for no comment, but a few little-known and new species are noted here and some minor nomenclatorial changes have been made after a study of type-specimens. I am greatly indebted to Professor Roewer for his help in examining most of the specimens noted below, besides others not mentioned here, and for confirming (or, in some cases, correcting) my observations.

In his treatment of the family, Prof. Roewer has standardised the application of the few available criteria, and I propose to use the following equivalents for his German terms in specific descriptions :—

Zwischenzähne = *intermediate teeth*.—Used in describing the cheliceral dentition.

Zylinderborsten = *cylindrical bristles*.—Bristles which may or may not be present on the ventral surface of the male pedipalpal metatarsus.

Sohlenhaare = *plantar bristles*.—Bristles which may or may not be differentiated on the ventral surface of the fourth tarsus in the male.

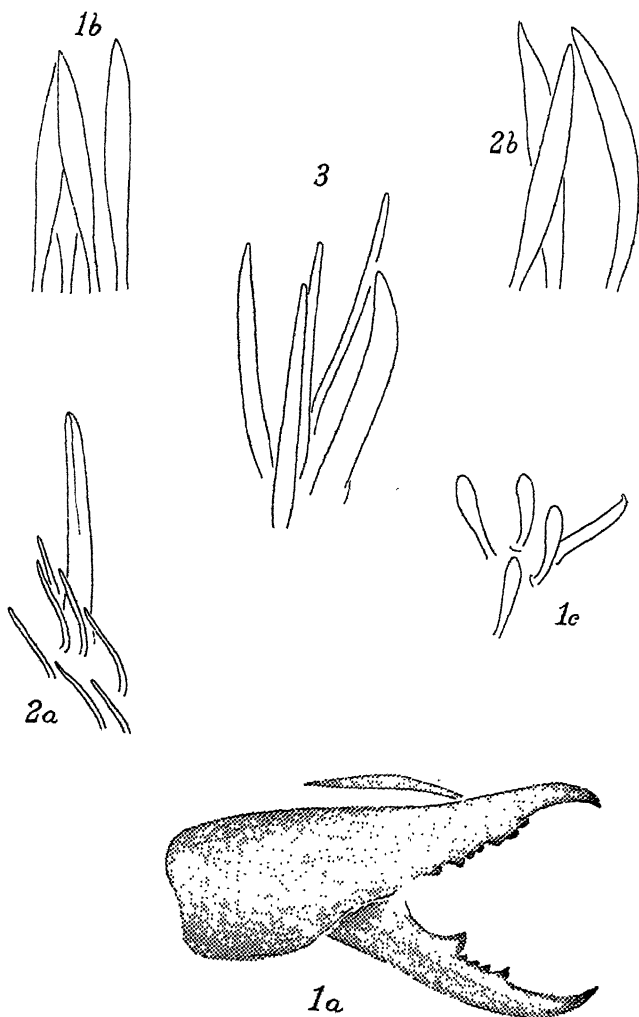
dunkler Mittelbinde = *median stripe*.—A dark longitudinal median stripe which may be present on the tergites of the opisthosoma.

In describing the shape of the ctenidia and the plantar bristles, Prof. Roewer's four forms (types I, II, III & IV, Roewer, 1934, p. 511, fig. 316) will be used. The length given is that of the *truncus* only, i. e., it does not include the chelicerae.

1. *Galeodes bacillifer* Pocock. (Fig. 1, a-c.)

Pocock, 1900, Fauna of British India, pp. 144–145; Roewer, 1934, in Bronn's Tierreich, 5 (4), iv. pp. 519, 524, 528, 529.

Material.—♂, ♀, juv. (syntypes), Northern Baluchistan (coll. Maynard and MacMahon).



- Fig. 1 *a*.—*Galeodes bacillifer* Pocock. Male syntype. Chelicera, $\times c. 6.5$; 1 *b*, group of ctenidia; 1 *c*, tarsal spine and group of plantar bristles.
- Fig. 2 *a*.—*Galeodes veemi*, sp. n. Tarsal spine and group of plantar bristles; 2 *b*, group of ctenidia.
- Fig. 3.—*Galeodila tillmani*, sp. n. Tarsal spine and group of plantar bristles. (Ctenidia, plantar bristles, and tarsal spines much enlarged.)

Prof. Roewer states that Pocock's type has two intermediate teeth in each cheliceral finger : it seems, however, that he must have examined only the female, where this is certainly the case, and since the female has page precedence over the male, it is to be regarded as the type of the species.

Male syntype: movable finger with three, fixed finger with two, intermediate teeth; cylindrical bristles present ventrally on the pedipalpal metatarsus; ctenidia present, type II; plantar bristles differentiated, type III; without a dark median stripe. Length 22 mm.

The specific identity of this male is in some doubt: it is certainly the specimen that Pocock describes, because it is found to have the abnormal spinal armature that he mentions (p. 145, footnote). Moreover, he states that the cheliceral teeth are like those of *G. indicus*, and his illustration of the latter (fig. 49 C, p. 142) shows three intermediate teeth in the movable finger. If the specimen belongs to the genus *Galeodes*, s. str. (and the abnormal spinal armature of the one remaining leg IV brings this in question), then it would appear to come nearest to *G. signatus* Roewer; if it is referred to *Galeodellus*, then it most resembles *Galeodellus pugnator* Roewer. Both these species are found in Baluchistan.

2. *Galeodes conversus* Roewer.

Roewer, 1934, in Bronn's Tierreich, 5 (4), iv. pp. 524, 531.

Material.—1 ♀, Smyrna (coll. R. MacAndrew); 1 ♀, Baku, Koch Collection (under *G. arabs*).

3. *Galeodes egregius* Roewer.

Roewer, 1934, in Bronn's Tierreich, 5(4)iv. pp. 519, 525, 530.

Material.—2 ♀♀, Baku (coll. E. S. Lindley).

4. *Galeodes forcipatus* Roewer.

Roewer, 1934, in Bronn's Tierreich, pp. 520, 531.

Material.—1 ♂, Smyrna (coll. R. MacAndrews); 1 ♂ (coll. E. S. Lindley).

5. *Galeodes indicus* Pocock.

Pocock, 1900, Fauna of British India, p. 412, 143; Roewer, 1934, in Bronn's Tierreich, 5 (4), iv. pp. 514, 528.

Material.—3 ♀♀, Pimpalner, E. Khandesh; 1 ♀, E. Khandesh; 1 ♀, Agra (coll. Dr. E. H. Hankin); 2 ♀♀, Shirpur, W. Khandesh.

These specimens were labelled *Galeodes indicus nigripes* in Mr. Pocock's writing.

G. indicus nigripes Poc. is not mentioned in the literature, and *G. i. obscurior* Poc. (1900, p. 143) is not represented in the collection under that name: but the published localities and collectors of the latter, so far as they are given, agree with the labels of the former, and it is fairly certain that *nigripes* is a manuscript name for the subspecies, whose description was later published under the name *obscurior*. According to Prof. Roewer, both *G. i. obscurior* and *G. i. australis* belong to *Galeodenna fischeri* Hirst; but I find that in all the specimens referred by Pocock to the former subspecies, the terminal tarsal segments of legs II and III each bear two spines, and these specimens belong therefore to the genus *Galeodes*, s. str. Moreover, colour is found to be so variable in the genus that they should not be separated, even subspecifically, from typical *G. indicus*.

6. *Galeodes rufulus* Pocock.

Galeodes orientalis rufulus Pocock, 1900, Fauna of British India, p. 139; Roewer, 1934 (under *Galeodellus*), in Bronn's Tierreich, 5 (4), iv. p. 545.

Galeodes hindostanus Roewer, 1934, in Bronn's Tierreich, 5 (4), iv. pp. 517, 523, 528.

Material.—47 ♀♀, Shirpur, W. Khandesh (coll. R. Pearson); 4 ♀♀, East Poona (coll. R. C. Wroughton); 1 ♀, Chanda, Central Provinces (coll. Blanford); c. 70 ♀♀, Pimpalner, E. Khandesh (coll. R. Pearson). Except for the single ♀ from Chanda, all these are to be regarded as syntypes of Pocock's subspecies.

Prof. Roewer includes *G. orientalis rufulus* Pocock under *Galeodellus orientalis* Stol., but Pocock's specimens prove to belong to the genus *Galeodes*, s. str., and the great majority belong to the species later described by Prof. Roewer as *Galeodes hindostanus*: the name of the species should therefore be *Galeodes rufulus*. The British Museum specimens agree closely with the description of *G. hindostanus*, which is based on four males and one female from Madura (Thar Desert), but it is found that

a well-defined median stripe is usually present, and the females may reach a length of 30 mm.

7. *Galeodes tunetanus* Kraepelin.

Kraepelin, 1899, Mitt. Mus. Hamburg. xvi. p. 204; 1901, Das Tierreich, xii. p. 25; Roewer, 1934, in Bronn's Tierreich, 5 (4), iv. pp. 517, 534.

Material.—1 ♀ Tunis (coll. C. de Boero), det. by A. S. Hirst.

The female of this species has never been described, and a short diagnosis is therefore given here :

Tarsal spines :—leg II 2.2.2/2, leg III 2.2.2/2, leg IV, left side 2.2.2/2/0, right side irregular. Ventral metatarsal spines :—leg II 1.2, leg III 1.1.2, leg IV 1.2.2; palp with five to six spines along the preaxial border and five spines along the post-axial border, not arranged in pairs. Movable finger with two, fixed finger with one, intermediate teeth. Ctenidia absent. Body yellow-brown in colour, the palpal tibia and metatarsus slightly darker, the chelicerae and propeltidium much darker brown. Median stripe present but weak. Length 30 mm.

8. *Galeodes veemi*, sp. n. (Fig. 2, *a-b*.)

Material.—1 ♂, holotype, 1 ♂, 2 ♀♀, paratypes; Fayum, Egypt (coll. C. W. Andrews), det. by A. S. Hirst as *Paragaleodes* ? *sericeus* Kraepelin.

Male.—Diagnosis: Tarsal spines :—leg II 2.2.2/2, leg III 2.2.2/2, leg IV 2.2.2/2/0. Ventral metatarsal spines :—leg II 1.2, leg III 1.2, leg IV 1.2.2; pedipalpal metatarsus with six pairs of ventral spines. Movable finger with three, fixed finger with two, intermediate teeth; ctenidia present, type II, on sixth opisthosomal sternite only; metatarsus of the pedipalp with cylindrical bristles; plantar bristles differentiated, type I; well marked dark median stripe present, body otherwise golden-yellow in colour. Length c. 30 mm.

Female.—Resembling male with regard to tarsal and metatarsal spines, intermediate teeth, and colour. Ctenidia absent. Length 28 to 32 mm.

This species closely resembles *G. scalaris* C. L. Koch, especially in the female; the males, however, are distinguished by the presence of cylinder-bristles and the form and arrangement of the ctenidia (which belong

to type I in *G. scalaris*, and are scattered on opisthosomal sternites 5 and 7 besides the row on 6).

9. *Galeodenna australis* (Pocock).

Galeodes indicus australis Pocock, 1900, Fauna of British India, p. 143.

Galeodes fischeri Hirst, 1908, Rec. Ind. Mus. Calcutta, ii. p. 244.

Galeodenna fischeri Roewer, 1934, in Bronn's Tierreich, 5 (4), iv. p. 514.

After comparing the type-specimens I agree with Prof. Roewer that *G. i. australis* Pocock and *G. fischeri* Hirst are identical: but since, from a nomenclatorial point of view, specific and subspecific names are of the same value, the application of the law of priority makes the name of the species *Galeodenna australis* (Pocock).

10. *Galeodibus tripolitanus* Roewer.

Roewer, 1934, in Bronn's Tierreich, 5 (4), iv. pp. 512, 513.

Material.—1 ♂, Mehediya (mouth of Seba River), Morocco (coll. E. G. B. Meade Waldo).

11 a. *Galeodila*, sp. near *bengalica* Roewer.

Material.—1 ♀, Teheran, Iran.

11 b. *Galeodila*, sp. near *pusilla* Roewer.

Material.—1 ♀, Somaliland.

Although these species appear to be new, it is not proposed to describe and name them because the material is insufficient. They are of interest, however, in that, with the following species, they fill gaps in the distribution of the genus, which is known otherwise only from British India (*Galeodila bengalica* Roewer), Afghanistan (*Galeodila trinkleri* Roewer) and Algeria (*Galeodila pusilla* Roewer).

12. *Galeodilla tillmani*, sp. n. (Fig. 3.)

Material.—1 ♂, holotype, Burao, British Somaliland (coll. Dr. John Tillman), April 1939.

Male.—Diagnosis: tarsal spines:—leg II 1.2.2/2, leg III 1.2.2/2, leg IV 2.2.2/2/1. Ventral metatarsal spines:—leg II 1.2, leg III 1.2, leg IV 1.2.2; pedipalpal metatarsus with four pairs of ventral spines and an additional spine at the base of the row on the post-axial

side. Movable finger with two, fixed finger with one, intermediate teeth; ctenidia absent; metatarsus of the pedipalp with cylindrical bristles; plantar bristles differentiated, type I; opisthosoma uniformly dark-brown dorsally and ventrally; propeltidium dark brown anterolaterally; appendages pale yellow except for the palpal femora, tibiae and metatarsi, and the femora II of leg IV, which are brown. Length 36 mm.

This species differs from *Galeodila bengalica* in the ventral spines of the pedipalpal metatarsus and in the absence of ctenidia.

XXXIV.—*Three new Genera of Mallophaga from Charadriiformes.* By THERESA CLAY, B.Sc., and R. MEINERTZHAGEN.

[Plate XIII.]

It is apparent from drawings in the British Museum, prepared by Mr. Terzi for the late Dr. Waterston, that the latter intended to describe four genera from the Charadriiformes, namely *Rhynonirmus* Thompson, 1935, and the three described below. Unfortunately, all Dr. Waterston's manuscript has been lost, so that his descriptions and names he intended for these genera cannot be used. A fifth genus, *Parricola* Harrison, 1915, from the Jacanidæ (Charadriiformes) is distinguished by the absence of a distinct clypeal suture.

LUNACEPS, gen. nov.

This genus is distinguished from all other known genera by the characters of the clypeal region.

Head with narrow hyaline margin arising from clypeal suture; internal and clypeal bands broadly fused anteriorly for about a third of their lengths; clypeal signature small and irregular in shape and may be joined to fused part of clypeal and internal bands. Dorsal antennal bands pass inwards on each side to form transverse suture across head. Dorsal occipital band and transverse antennal band absent (text-fig. 1). Pterothorax with lateral margins divergent. Abdomen with segment I small; paratergal plates simple without inwardly directed process and only rarely with elongated re-entrant

"heads." Tergal plates transversely continuous and rarely with partial median division. Segment IX in the male clearly demarcated from segment VIII.

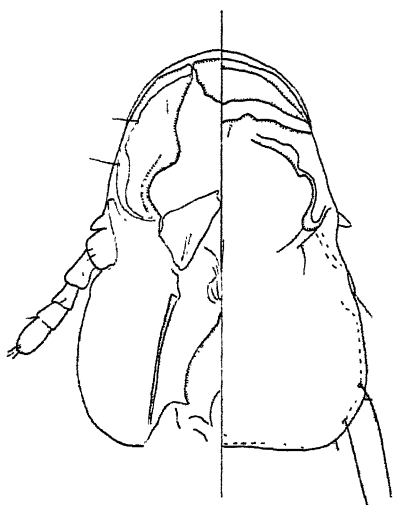
Genotype : *Degeeriella actophila* (Kellogg & Chapman), 1899.

Type-host : *Crocethia alba* (Pallas), Sanderling.

Specimens of this genus have been examined from the following genera :—

Hæmatopus, *Numenius*, *Limosa*, *Crocethia*, *Ereunetes*, *Erolia*, *Philomachus*, *Micropalama*.

Text-fig. 1.



Lunaceps actophilus. ♀.

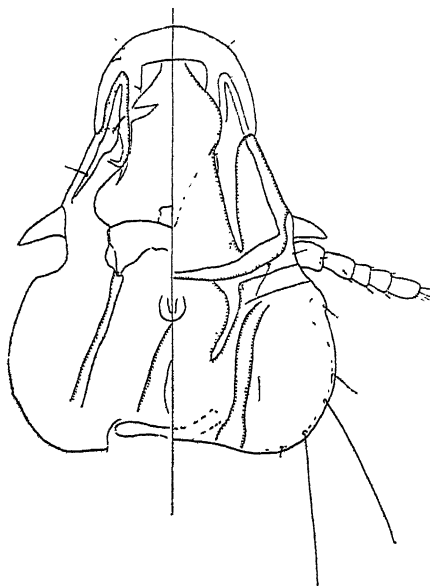
CARDUICEPS, gen. nov.

This genus is distinguished by the characters of the clypeal region and abdomen.

Head with broad hyaline margin arising from clypeal suture ; clypeal and internal bands fusing at their anterior ends ; clypeal signature large. Dorsal antennal bands pass inwards and downwards to form narrow suture each side of pre-antennal region. Heavily chitinized transverse antennal band across head at level of mandibles ; dorsal and ventral occipital bands present (text-fig. 2).

Pterothorax short with lateral margins not divergent. Abdomen with segment I small; paratergal plates without elongated re-entrant "heads" and bearing anterior and posterior inwardly directed processes; the posterior process continued across tergal plate as thickened bar, giving a characteristic appearance to abdomen. Tergal plates entire and transversely continuous. Male abdomen with segment IX much reduced, not protruding and scarcely demarcated from segment VIII.

Text-fig. 2.

*Carduiceps complexivus*. ♀.

Genotype: *Degeeriella complexiva* (Kellog & Chapman), 1899.

Type-host: *Crocethia alba* (Pallas), Sanderling.

Specimens of this genus have been examined from the following genera:—

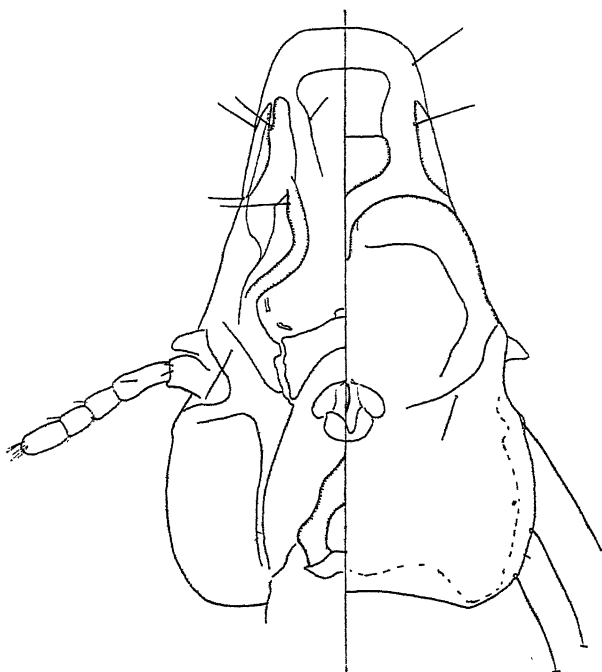
Limosa, *Limnodromus*, *Crocethia*, *Ereunetes*, *Erolia*, *Philomachus*, *Micropalama*.

QUADRACEPS, gen. nov.

This genus, which is more widely spread throughout the Charadriiformes than either *Luniceps* or *Carduiceps*, is distinguished from the two latter by the hyaline margin arising anterior to the clypeal suture and by the presence of a median dorsal pre-antennal suture.

Head with broad hyaline margin arising from near anterior end of clypeal band; clypeal and internal bands fused near their anterior terminations but with

Text-fig. 3.



Quadriceps vanelli (Denny). ♀.

free anterior ends. Dorsal antennal bands on each side pass inwards to form narrow median suture (text-fig. 3). Narrow suture each side of post-antennal region, transverse antennal band and dorsal occipital bands as in *Carduiceps* present in some species. Pterothorax with lateral margins divergent. Abdomen with segment I small; paratergal plates with elongated re-entrant

“heads,” but without inwardly directed processes. Tergal plates of some or all segments showing either partial or complete division into two plates. Segment IX in male clearly demarcated from segment VIII.

Genotype: *Degeeriella vanelli* (Denny), 1842.

Type-host: *Squatarola squatarola* (Linn.), Grey Plover.

Specimens of this genus have been examined from the following genera:—

Rostratula, *Hæmatopus*, *Chettusia*, *Vanellus*, *Lobivanellus*, *Hemiparra*, *Afribyx*, *Stephanibyx*, *Hoplopterus*, *Sarcio-phorus*, *Squatarola*, *Charadrius*, *Aichmorrhynchus*, *Tringa*, *Catoptrophorus*, *Arenaria*, *Limnodromus*, *Ibidorhyncha*, *Himantopus*, *Recurvirostra*, *Phalaropus*, *Dromas*, *Burhinus*, *Pluvianus*, *Cursorius*, *Glareola*, *Chionis*.

All genera of suborder Lari except *Pagophila*, *Phætusa*, and *Gygis*.

Key to Genera of *Degeeriellini* from *Charadriiformes*.

1. Without hyaline margin or definite clypeal signature. *Rhynonirmus*.
With hyaline margin and clypeal signature 2.
2. Without definite clypeal suture *Parricola*.
With definite clypeal suture 3.
3. Hyaline margin arising anterior to clypeal suture;
median vertical pre-antennal suture *Quadriceps*.
Hyaline margin arising at clypeal suture; without
median vertical suture 4.
4. With transverse pre-antennal suture *Luniceps*.
With vertical pre-antennal suture each side of head.. *Carduiceps*.

EXPLANATION OF PLATE XIII.

Fig. 1. *Luniceps actophilus* (Kell. & Chapman).

Fig. 2. *Carduiceps complexivus* (Kell. & Chapman).

Fig. 3. *Quadriceps vanelli* (Denny).

Fig. 4. *Rhynonirmus infuscatus* (Osborn).

Fig. 5. *Parricola sulcata* (Piaget).

XXXV.—Beiträge zur Kenntnis der Conopiden.—II.

Von O. KRÖBER, Hamburg.

(Continued from p. 395.)

III. DIE CONOPIDEN SÜD- UND MITTELAMERIKAS (incl. Antillen und Mexiko).

Seit Erscheinen meines Kataloges der Conopiden 1917 hat sich die Zahl der Gattungen und Arten ganz bedeutend

vergrößert und namentlich auch die Kenntnis von der Verbreitung dieser doch immerhin relativ seltenen Tiere erweitert, die meistens nur ganz vereinzelt in die Hände des Sammlers geraten, zumal, wenn derselbe nicht mit ihren Lebensgewohnheiten vertraut ist. Aus dem abgehandelten Gebiet sind jetzt alle 4 Unterfamilien mit zusammen 13 Gattungen und 113 Arten vertreten. Inzwischen habe ich eine ganze Reihe als rein nord-amerikanisch angesehener Arten für Mittel- und selbst Südamerika nachweisen können, so dass es sich empfiehlt, bei neuen Arten stets die nordamerikanische Fauna durchzuprüfen, besonders die von den alten Autoren aus Mexico und den Südstaaten oft recht kümmerlich beschriebenen Spezies, zumal jene über die Färbungsverhältnisse (ob Integument oder Toment) meist vollständig hinwegsehen.

Bestimmungstabelle der Unterfamilien.

- | | |
|--|--|
| 1. Drittes Fühlerglied mit Endgriffel | 1. U.-F. <i>Conopinæ</i> (6 |
| Drittes Fühlerglied mit Rückenborste | 2. [Gattungen). |
| 2. Untergesicht stark gekielt. Rüssel sehr auffallend lang und dünn. Lippen sehr lang, fadenförmig, oft nach aussen umgerollt. Fühlerborste deutlich 3 gliedrig. Körper sehr zart und schlank. Weibchen mit langer, vorstehender Legeröhre. Analzelle sehr kurz. | 2. U.-F. <i>Stylogasterinæ</i> [(nur 1 Gattung: <i>Stylogaster</i> Macq.). |
| Untergesicht nie hoch gekielt. Rüssel nie auffallend dünn und fädlich, oft aber kurz, fast in der Mundhöhle verborgen. Fühlerborste 2 gliedrig | 3. |
| 3. Weibchen mit am Bauch eingeschlagener Legeröhre; Männchen mit der Länge nach gespaltenem Analsegment | 3. U.-F. <i>Dalmanniinæ</i> [(1 Gattung: <i>Parazodion</i> Krb.). |
| Weibchen mit unpaarem Organ (Theka); Männchen mit halbkugeligem Analsegment | [(5 Gattungen).
4. U.-F. <i>Myopinæ</i> |

Bestimmungstabelle der Gattungen.

CONOPINÆ.

- | | |
|---|--------------------------|
| 1. Untergesicht ohne Gruben, scharf und hoch gekielt. Fühlergriffel 2 gliedrig | <i>Tropidomyia</i> Will. |
| Untergesicht stets mit Gruben, die durch einen flachen Kiel getrennt sind | 2. |
| 2. Das 3. Fühlerglied ist weitaus das längste | 3. |
| Das 3. Fühlerglied ist nie das längste. | 4. |
| 3. Rüssel über $2\frac{1}{2}$ mal so lang wie der Kopf. 3. Fühlerglied höchstens doppelt so lang wie das 2. | <i>Aconops</i> Krb. |

- Rüssel höchstens $1\frac{1}{2}$ mal so lang wie der Kopf. 3. Fühlerglied $1\frac{1}{2}$ mal so lang wie das 2. *Microconops* Krb.
4. 2. und 3. Abdominalsegment nahezu gleich lang und gleich stark. Vertexkissen vorn flach begrenzt, ohne Andeutung eines Ozellenhöckers. Analsegment quer zur Körperachse gestellt *Conops* L.
2. Abdominalsegment bedeutend länger als das 3. Abdomen wespenförmig gestielt erscheinend 5.
5. Vertexkissen mit deutlichem Ozellenhöcker. *Physoconops* Szil.
- Vertexkissen ohne Spur eines Ozellenhöckers. Analsegment quer zur Längsachse des Körpers gestellt *Physocephala* Schin.

MYOPINÆ.

1. Rüssel nur an der Basis gekniet 2.
Rüssel an der Basis und in der Mitte gekniet. 3.
2. 2.-4. Abdominalsegment vollkommen verschmolzen *Neozodion* Szil.
2.-4. Abdominalsegment deutlich getrennt. *Zodion* Latr.
3. Untergesicht stark verlängert, weit unter die Augen herabsteigend; die Backen wenigstens doppelt so lang wie der Augendurchmesser. Abdomen bedeutend kürzer als die Flügel, oben plattgedrückt.... *Myopa* F.
Untergesicht nur mässig verlängert, die Backen höchstens so lang wie der Augendurchmesser, meistens viel kürzer 4.
4. Fühler meistens kopflang. Kleine, graue bis schwarze Arten mit nie ganz rotgelber Stirn. Hinterleib kurz, namentlich im weiblichen Geschlecht *Occeomyia* Rob.-Desv.
Fühler kürzer als ihr Abstand vom Scheitel. Grosse rotbraune oder schwarze stark glänzende Arten mit ganz rotgelber Stirn. Abdomen des Weibchens lang und schmal, weit vorstehend, umgebogen *Sicus* Scop.

VERZEICHNIS DER ARTEN.

1. Gattung TROPIDOMYIA Will.

Canad. Entomol. vol. 22, p. 11 (1888).

Typus, *T. bimaculata* Will., l. c. p. 11 (1888).

1. *T. bimaculata* Will., ♂♀, l. c. p. 11 (1888).—Brasilien, Mexiko.

2. Gattung ACONOPS Krb.

Archiv f. Naturg. vol. 83, A 7 (1917), p. 142 (1919).

Typus, *A. longistylus* Krb., l. c. vol. 81, A 5, p. 149 (1915).

1. *A. antennatus* Krb., ♂♀, l. c. vol. 81, p. 150 (1915) [*Conops*].—Argentinien.
2. *A. longistylus* Krb., ♂♀, l. c. vol. 81, p. 149 (1915) [*Conops*].—Brasilien, Mexiko.
3. *A. ocellatus* Gigl.-Tos, ♂♀, Boll. R. Univ. Torino, vol. 7, no. 132 (1892) [*Conops*].—Brasilien, Mexiko.
parvus Will., Kansas Univ. Quart. vol. 1, p. 46 (1892).

3. Gattung MICROCONOPS Krb.

Archiv f. Naturg. vol. 81, A 1, p. 77 (1915).

Typus, *M. ornatus* Krb., l. c. p. 78 (1915).

1. *M. atratula* Mall., ♂, Dipt. Patag. and S. Chile, vol. 6, 3, p. 173 (1933).—Chile.

4. Gattung CONOPS L.

Fauna Suecia, p. 467 (1761).

Typus, *C. macrocephala* L., l. c. p. 467 (1761).

Conopæus Rond., Mag. de Zool., t. 153, f. 2, p. 167 (1850) [*Conopæjus*].

Conopilla Rond., Prodr. vol. 1, p. 56 (1856).

Pleurocerina Macq., Dipt. exot. suppl. 4, p. 164 (1851).

Sphixosoma Rond., Prodr. vol. 2, p. 223 (1857).

Nach Malloch sind *Aconops* Krb. und *Microconops* Krb. U.-Gattg. von *Conops* L.

1. *C. aureoscutellatus* Krb., ♀, Stett. Ent. Zeitg. vol. 98, p. 96, f. 1 (1937).—Costa Rica.
2. *C. brunneosericeus* Krb., ♀, l. c. vol. 98, p. 100 (1937).—Brasilien.
3. *C. gracilis* Will., ♂♀, Trans. Conn. Acad. vol. 6, p. 377 (1885).—Amer. sept. mer., Chile.
4. *C. hermanni* Krb., ♂♀, Archiv f. Naturg. vol. 81, p. 145 (1915).—Argentinien.
5. *C. magnus* Will., ♂♀, Kansas Univ. Quart. vol. 1, no. 1, p. 43 (1892).—Chile, Brasil, Mexiko.
6. *C. palliditarsis* Krb., ♀, Konowia, vol. 6, p. 139, f. 9 (1927).—Costa Rica.
7. *C. sequax* Will., ♂♀, Biolog. Centr.-Amer. Dipt. vol. 3, p. 80 (1891/92).—Venezuela, Mexiko.
8. *C. velutinus* Krb., ♂, Archiv f. Naturg. vol. 81, p. 146 (1915).—Argentinien.

Ob die folgenden als *Conops* beschriebenen Arten heute noch in diese Gattung gehören, bleibt nachzuprüfen:—

1. *C. anthreas* Will., ♂♀, Biolog. Centr.-Amer. Dipt. vol. 3, p. 80 (1891/92).—Mexiko.
2. *C. aurifrons* Walk. (? ♂♀), List of Dipt. vol. 4, p. 1158 (1849).—Para.
flavifrons Wlk., l. c. vol. 3, p. 672 (1849).
3. *C. cayennensis* Macq., ♀, Dipt. exot. vol. 2, suppl. 3, p. 12 (1843).—Cayenne.
4. *C. costatus* F., ♀, Syst. Antl. p. 175 (1805).—Amer. sept. et mer.
5. *C. dimidiatipennis* Sichel, ♀, Ann. Soc. Ent. France, sér. 4, vol. 2, p. 120 (1862).—Montevideo.
6. *C. ephippium* Macq., ♂♀, Dipt. exot. suppl. 3, p. 11 (1847).—Amér. mér.
7. *C. excisus* Wied., ♂♀, Auss. zweifl. Ins. vol. 2, p. 234 (1830).—Amér. sept., Mexiko.
8. *C. formosus* Krb., ♂, Archiv f. Naturg. vol. 81, p. 124 (1915).—Mexiko.
9. *C. grandis* Will., ♂♀, Kansas Univ. Quart. vol. 1, no. 1, p. 44 (1892).—Brasilien.
10. *C. guayanica* Curr., ♀, Bull. Amer. Mus. N. Hist. vol. 66, p. 417 (1934).—Brit. Guiana.
11. *C. inornatus* Will., ♂♀, Kansas Univ. Quart. vol. 1, no. 1, p. 45 (1892).—Brasilien.
12. *C. lugubris* Macq., ♀, Suit. a Buff. vol. 2, p. 26 (1835).—Brasilien.
- ? *argentifacies* Will., l. c. vol. 1, p. 43 (1892) (ohne Beschreibung!).
13. *C. mexicanus* Krb., ♀, Archiv f. Naturg. vol. 81, p. 128 (1915).—Mexiko.
14. *C. nobilis* Will., ♀, Kansas Univ. Quart. vol. 1, no. 1, p. 45 (1892).—Brasilien.
15. *C. ornatus* Will., ♂, l. c. vol. 1, p. 46 (1892).—Brasilien.
16. *C. palpiifrons* Coqu., ♂♀, Proc. Ent. Soc. Wash. vol. 6, p. 92 (1902).—Mexiko, Amer. centr.
17. *C. pictifrons* Krb., ♀, Archiv f. Naturg. vol. 81, p. 133 (1915).—Mexiko.
18. *C. pruinosus* Big., ♂, Ann. Soc. Ent. France, sér. 6, vol. 7, p. 46 (1887).—Amér. mér. (?).
19. *C. punctum* Big., ♂♀, l. c. ser. 6, vol. 7, p. 45 (1887).—Amér. mér.

20. *C. sericeus* Ol., ♂, Encycl. Méthod. vol. 6, p. 111 (1791).—Cayenne.
21. *C. sericeus* Walk. (? ♂♀), Dipt. Saund. vol. 4, p. 256 (1852).—Amazonas.
22. *C. soror* Krb., ♀, Archiv f. Naturg. vol. 81, p. 131 (1915).—Mexiko.
23. *C. sylvosus* Will., ♂♀, Trans. Conn. Acad. vol. 4, p. 329 (1883).—Amér. sept. Mexiko.

5. Gattung *PHYSOCONOPS* Szil.

Annal. Mus. Nat. Hungar. vol. 24, p. 588 (1926).

Typus, *P. brachyrhynchus* Macq. Dipt. exot. vol. 2, p. 315, t. 1, f. 3 (1848).

1. *P. abruptus* Krb., ♂♀, Archiv f. Naturg. vol. 81, p. 144 (1915) [*Conops*].—Argentinien.
2. *P. angustifrons* Will., ♂♀, Kansas Univ. Quart. vol. 1, no. 1, p. 44 (1892) [*Conops*].—Brasil, Peru.
3. *P. auratus* Towns., ♂♀, Trans. Amer. Ent. Soc. vol. 27, p. 161 (1901) [*Conops*].—Amér. sept., Mexiko.
4. *P. bulbirostris* Lw., ♂♀, Neue Beiträge, vol. 1, p. 30 (1883) [*Conops*].—Amér. sept. et mer. Mexiko, Brasilien, Paraguay.
5. *P. costaricensis* Krb., ♀, Konowia, vol. 6, p. 135, f. 10 (1927) [*Conops*].—Costa Rica.
6. *P. discalis* Will., ♂♀, Biol. Centr.-Amer., Dipt. vol. 3, p. 80 (1891/92) [*Conops*].—Mexiko, Argentinien, Paraguay, Brasilien, Bolivien.

angustus Krb., ♂♀, Archiv f. Naturg. vol. 81, p. 152 (1915).

nigromarginatus Krb., ♂, l. c. vol. 81, p. 151 (1915).

7. *C. fronto* Will., ♂♀, Trans. Conn. Acad. vol. 6, p. 378 (1885) [*Conops*].—Amér. sept., Mexiko.

pulchellus Krb., ♂, Archiv f. Naturg. vol. 81, p. 134 (1915).

8. *C. gracilior* Krb., ♂♀, l. c. vol. 81, p. 150 (1915) [*Conops*].—Paraguay.
9. *C. ornatifrons* Krb., ♂♀, l. c. vol. 81, p. 148 (1915) [*Conops*].—Peru.
10. *C. perbellum*, sp. n., ♂.—Argentinien.
11. *C. pictus* F., ♂♀, Ent. Syst. vol. 4, p. 39 (1794) [*Conops*].—Amér. sept. et mer., Cuba, Portorico, S. Domingo, W. Indien.

Ramondi Big., in Ramon de la Sagras Cuba, p. 808 (1857).

12. *C. rufipennis* Macq., ♂♀, Dipt. exot. vol. 3, suppl. 3, p. 10 [*Conops*] (1843).—Argentinien.

6. Gattung PHYSOCEPHALA Schin.

Wiener Entom. Monatsschr. vol. 5, p. 137 (1861).

Typus, *P. nigra* Deg. [*Conops*] Ins. vol. 6, p. 105, t. 15, f. 9 (1776).

1. *P. analis* F., ♂♀, Syst. Antl. p. 175 (1805) [*Conops*].—Mexiko, Costa Rica, Brasilien.

carbonaria Big., Ann. Soc. Ent. Fr. sér. 6, vol. 7, p. 42 (1887) [*Conops*].
? *nigrofacies* Big., ♂, l. c. sér. 6, vol. 7, p. 40 [*Conops*] (1887).

2. *P. bicolor* Krb., ♂, Archiv f. Naturg. vol. 81, p. 136 (1915).—Matto Grosso.

3. *P. bimaculata* Krb., ♂♀, l. c. vol. 81, p. 140 (1915).—Amer. mer.

4. *P. bipunctata* Macq., ♂♀, Dipt. exot. vol. 3, p. 11 (1847) [*Conops*].—Amer. mer.

5. *P. brasiliensis* Krb., ♀, Archiv f. Naturg. vol. 81, p. 136 (1915).—Brasilien.

6. *P. brunnipes* Krb., ♀, Konowia, vol. 6, p. 131, f. 6 (1927).—Amer. mer.

7. *P. maxima* Gigl.-Tos, ♀, Boll. R. Univ. Torino, vol. 7, nr. 132 (1893) [*Conops*].—Mexiko.

8. *P. nervosa* Krb., ♀, Archiv f. Naturg. vol. 81, p. 144 (1915).—Argentinien.

9. *P. picipes* Krb., ♀, l. c. vol. 81, p. 134 (1915).—Brasilien.

10. *P. piciventris* v. d. W., ♂♀, Tijdschr. v. Entom. vol. 26, p. 12, t. 1, f. 11 (1883) [*Conops*].—Arg., Bras., Parag.

11. *P. pulchripennis* Krb., ♀, Konowia, vol. 6, p. 132 (1927).—Argentinien.

12. *P. rufus* Will., ♂♀, Kansas Univ. Quart. vol. 1, nr. 1, p. 44 (1892) [*Conops*].—Brasilien.

rufithorax Krb., ♀, Archiv f. Naturg. vol. 81, p. 138 (1915).—Paraguay, Brasilien, Peru.

13. *P. segethi* Rond., ♂♀, Archiv per la Zool. vol. 3. (sep. !), p. 13 (1863) [*Conops*].—Chile.

costata Schin., Novara Reise, p. 371 (1868).

tricolor Big., ♂, Ann. Soc. Ent. France, sér. 6, vol. 7, p. 41 (1887).—Montevideo.

14. *P. texana* Will., ♂♂, Trans. Conn. Acad. vol. 4, p. 338 [Conops] (1883).—Amer. sept.
ochreiceps Big., ♂, Ann. Soc. Ent. France, sér. 6, vol. 7, p. 39 [Conops] (1887).—Amer. sept., Mexiko.
15. *P. soror* Krb., ♂, Archiv f. Naturg. vol. 81, p. 143 (1915).—Argentinien.
16. *P. sororcula* Will., ♂♀, Biolog. Centr.-Amer., Dipt. vol. 3, p. 83 (1892) [Conops].—Mexiko.
17. *P. testacea* v. d. W., ♂♀, Tijdschr. v. Entom. vol. 26, p. 134 (1883) [Conops].—Argentinien.
18. *P. unicolor* Kröb., ♀, Archiv f. Naturg. vol. 81, p. 145 (1915).—Paraguay.
19. *P. vespiiformis* Kröb., ♀, l. c. vol. 81, p. 135 (1915).—Amer. mer.
20. *P. xanthops* Will., ♂♀, Biolog. Centr.-Amer. Dipt., vol. 3, p. 83 (1892).—Mexiko.

7. Gattung STYLOGASTER Macq.

Hist. Nat. Dipt. vol. 2, p. 38 (1835).

Typus, *S. stylata* F., Syst. Antl. p. 177 (1805).

Stylomyia Westw., Proc. zool. Soc. London, vol. 18, p. 270 (1850).

Ptychoproctus Big., Rev. et Mag. de Zool. 2 sér. t. 11, p. 308 (1859).

1. *S. abdominalis* Krb., ♀, Entom. Mitt. Berlin, vol. 3, no. 10/12, p. 352 (1914).—Bolivien.
2. *S. biannulata* Say, ♂♀, Journ. Acad. Nat. Sci. Phil. vol. 3, p. 81 (1823).—Amer. sept. et mer. Texas, Mexiko.

stylata Wied., Auss. zweifl. Ins. vol. 2, p. 243 (1830) [*Myopa*].

confusa Westw., Proc. zool. Soc. London, vol. 18, p. 271, t. 19, f. 4 (1850).

3. *S. apicalis* Aldr., ♂♀, Proc. U.S. Nat. Mus. vol. 78, p. 21 (1930).—Honduras, Canal Zone.
4. *S. banksi* Aldr., ♂♀, l. c. vol. 78, p. 18 (1930).—Canalzone.
5. *S. breviventris* Aldr., ♂♀, l. c. vol. 78, p. 19 (1930).—Brit. Guiana.
6. *S. currani* Aldr., ♂♀, l. c. vol. 78, p. 16 (1930).—Canal Zone.
7. *S. decorata* Aldr., ♂♀, l. c. vol. 78, p. 16 (1930).—Costa Rica.

8. *S. ethiopa* Towns., ♂♀, Ann. & Mag. Nat. Hist. ser. 6, vol. 19, p. 26 (1897).—Amer. centr. et mer., Costa Rica, Mexiko, Honduras, Canal Zone.
æthiops Szil. (n. nom.), Ann. Mus. Nat. Hung. vol. 24, p. 593 (1926).
9. *S. fasciata* Aldr., ♂, l. c. vol. 78, p. 20 (1930).—Brit. Guiana.
10. *S. indistincta* Aldr., ♂, l. c. vol. 78, p. 24 (1930).—Canal Zone.
11. *S. minuta* Towns., ♂♀, Ann. & Mag. Nat. Hist. ser. 6, vol. 19, p. 27 (1897).—Mexiko, Honduras, Canal Zone, Peru.
12. *S. ornatipes* Krb., ♂, Entom. Mitt. Berlin, vol. 3, nr. 10/12, p. 350 (1914).—Brasilien.
13. *S. panamensis* Aldr., ♀, l. c. vol. 78, p. 26 (1930).—Canal Zone.
14. *S. pectinata* Aldr., ♂, l. c. vol. 78, p. 22 (1930).—Honduras, Peru.
15. *S. peruviana* Aldr., ♀, l. c. vol. 78, p. 25 (1930).—Peru.
16. *S. rectinervis* Aldr., ♂♀, l. c. vol. 78, p. 23 (1930).—Brit. Guiana, Costa Rica.
17. *S. speciosa* Aldr., ♀, l. c. vol. 78, p. 22 (1930).—Canal Zone.
18. *S. stylata* F., ♂♀, Syst. Antl. p. 177 (1805) [*Conops*].—Brasilien, Paraguay.
var. *argentina* Krb., ♂, Konowia, vol. 8, p. 174 (1929) [*S. biannulata* Say var.].—Argentin.
19. *S. stylosa* Towns., ♂♀, Ann. & Mag. Nat. Hist. ser. 6, vol. 19, p. 27 (1897).—Canal Zone, Panama, Honduras, Costa Rica, Guatemala.
horvathi Szil., ♂, Ann. Mus. Nat. Hung. vol. 24, p. 592, f. 2 (1928).—Costa Rica.

8. Gattung PARAZODION Krb.

Konowia, vol. 6, p. 135 (1927).

Typus, *P. schmidtii* Krb., l. c. vol. 6, p. 136, f. 11 (1927).

1. *P. affinis*, sp. n., ♂.—Brasilien.
2. *P. palliditinctum*, sp. n., ♀.—Brasilien.
3. *P. pilosum*, sp. n., ♂.—Mexiko.
4. *P. schmidtii* Krb., ♂♀, Konowia, vol. 6, p. 136, f. 11 (1927).—Costa Rica.

9. Gattung ZODION Latr.

Préc. de caract. gén. d. Ins. (1796), p. 162.

Typus, *Z. cinereum* F., Entom. syst. vol. 4, p. 399
[*Myopa*] (1794).

1. *Z. abitus* Adams, ♀, Kansas Univ. Sci. Bull. vol. 2, p. 33 (1903).—Amer. sept., Brasilien.
2. *Z. americanum* Wied., ♂♀, Auss. zweifl. Ins. vol. 2, p. 242 (1830).—Argent., Venez., Columb., Brasil.
nanellum Lw., ♂♀, Cent. 7, no. 75, Berl. Ent. Zeit. p. 42 (1869).—Amer. sept. et mer.
? *occidentis* Walk., List Dipt. Brit. Mus. vol. 3, p. 676 (1885).
3. *Z. analis* Krb., ♂♀, Archiv f. Naturg. vol. 81, p. 113 (1915).—Chile.
4. Var. *peruvianum* Krb., ♂, l. c. vol. 81, p. 101 (1915).—Peru, Mexiko.
5. *Z. aureopygium* Krb., ♂♀, l. c. vol. 81, p. 114 (1915).—Paraguay, Brasilien.
6. *Z. auricaudatum* Will., ♂♀, Biolog. Centr.-Amer., Dipt. vol. 3, p. 85, t. 2, f. 14 a (1891/92).—Mexiko, Costa Rica, Peru.
7. *Z. brasiliensis*, sp. n., ♀.—Brasilien.
8. *Z. costaricensis* Krb., ♂♀, Stett. Ent. Zeitg. vol. 98 (1937).—Costa Rica.
9. *Z. dibaphus* Krb., ♂♀, Archiv f. Naturg. vol. 81, p. 112 (1915).—Argentinien.
10. *Z. flavocaudatum* Big., ♂, Ann. Soc. Ent. France, sér. 6, vol. 7, p. 205 (1887).—Chile.
11. *Z. grisescens*, sp. n., ♂.—N. Argentinien.
12. *Z. maculiventris* Krb., ♀, Archiv f. Naturg. vol. 81, p. 108 (1915).—Mexiko.
13. *Z. obliquefasciatum* Macq., ♂♀, Dipt. exot. suppl. 1, p. 269 [*Myopa*] (1845), Amer. sept., Mexiko.
leucostoma Will., Trans. Conn. Acad. vol. 6, p. 380 (1885).
splendens Jaenn., Neue Exot. Dipt. p. 405 (1866).
14. *Z. pictum* Schin., ♂♂, Novara Reise, Dipt. p. 370 (1868).—Columb., Boliv., Venez., Mexiko.
15. *Z. punctipennis* Krb., ♂♀, Archiv f. Naturg. vol. 81, p. 111 (1915).—Chile, Argentinien.
16. *Z. pygmaeum* Will., ♂♀, Trans. Conn. Acad. vol. 6, p. 381 (1885).—Amer. sept., Mexiko, Brasilien.

17. *Z. zebrinum* Big., ♂, Ann. Soc. Ent. France, sér. 6, vol. 7, p. 204 (1887).—Mexiko.

aureopictum Krb., ♂, Konowia, vol. 6, p. 138 (1927).—Costa Rica.
 ? *auricaudatum* Will., ♂♀, Biol. Centr.-Amer., Dipt. vol. 3, p. 85, t. 2, f. 14 a (1891/92).—Mexiko.

10. Gattung NEOZODION Szil.

Ann. Mus. Nat. Hung. vol. 24, p. 590 (1926).

Typus, *N. pruinatum* Szil. l. c. vol. 24, p. 590 (1926).

1. *N. pruinatum* Szil., ♀, Annal. Mus. Nat. Hung. vol. 24, p. 590 (1926).

11. Gattung MYOPA F.

System. entomol. p. 798 (1775).

Typus, *M. testacea* L., Syst. Nat. ed. 11, vol. 2, p. 1006 [Conops] (1759).

Fairmairia Rob.-Desv., Bull. Soc. Sci. Hist. Nat. l'Yonne, 7, p. 111, (1853).

Gonirhynchus Rond., Prodr. vol. 3, p. 241 (1857).

Haustellia Rob.-Desv., l. c. p. 127 (1853).

Lonchopalpus Rob.-Desv., l. c. p. 115 (1853).

Myopella Rob.-Desv., l. c. p. 98 (1853).

Myopina Rob.-Desv., l. c. p. 119 (1853).

Phorosia Rob.-Desv., l. c. p. 109 (1853).

Pictinia Rob.-Desv., l. c. p. 95 (1853).

Purpurella Rob.-Desv., l. c. p. 117 (1853).

1. *M. pictipennis* Will., ♀, Trans. Conn. Acad. vol. 6, p. 382 (1885).—Californien, Mexiko.
 2. *M. pulchra* Coqu., ♂♀, Canad. Entom. vol. 34, p. 198 (1902).—Mexiko.

12. Gattung OCCEMYIA Rob.-Desv.

Dipt. des Env. de Paris, *Myop.* p. 50 (1853).

Typus, *O. atra* F., Spec. Ins. vol. 2, p. 469 [*Myopa*] (1781).

Ecceomyia Graen., Bull. Wisconsin. Soc. vol. 8, Heft 1, p. 44 (1910).

Melanosoma Rob.-Desv., p. p. Dipt. Env. Paris, p. 44 (1853).

Oncomyia Lw., Berlin. ent. Zeitschr. vol. 10, p. 41 (Note) [1866].

Thecophora Rond., Prodr. vol. 2, p. 235 (1857).

1. *O. loraria* Lw., ♂♀, Cent. 7, no. 74 [*Oncomyia*], Berl. Ent. Zeit. p. 41 (1866).—Amer. sept., Mexiko.
 2. *O. abbreviata* Lw., ♂♀, l. c. p. 73 [*Oncomyia*] (1866).—Amer. sept., Mexiko.

13. Gattung SICUS Scop.

Entom. carn. p. 1004 (1763).

Typus, *S. ferrugineus* L., Fauna Suec. p. 468 [*Conops*] (1761).

1. *S. brevirostris* Coqu., ♂♀, Canad. Entom. vol. 34, p. 198 (1902).—Mexiko.

Bestimmungstabellen der Arten.

ACONOPS Krb.

1. Flügel grau mit quadratischem, braunem Fleck. 7–8 mm. *A. ocellatus* Gigl.-Tos.
 Flügel ohne braunen Fleck 2.
 2. 3. Fühlerglied so lang wie das 1. und 2. zusammen *A. longistylus* Krb.
 3. Fühlerglied höchstens so lang wie das 2... *A. antennatus* Krb.
A. longistylus Krb., 2 ♂♂ von Chilpancingo in Guerrero IV. und Nova Teutonia in Brasilien II.

CONOPS L.

1. Hinterleib ganz rotbraun. Stirn rotgelb. Hüften und *p* rotgelb *C. gracilis* Will., ♂♀.
 Hinterleib schwarz, höchstens die Grenze vom 2. und 3. Ring rotbraun oder gelbbraun 2.
 2. Flügelbinde wenigstens an der Basis leuchtend rostrot. Theka klein, schwarz. Durch weisslichen Glanz erscheint das schwarze Untergesicht olive *C. hermanni* Krb., ♂♀.
 Flügelbinde braun oder schwarzbraun, stets die Unterrandzelle ausfüllend 3.
 3. Untergesicht vollkommen schwarz 4.
 Untergesicht ganz oder teilweise gelb, wenigstens die Gesichtsgruben 6.
 4. Untergesicht mit wundervollem Metallglanz. Thorax schwarz mit breitem, Weissm Mittelstreif, der an der Quernaht endet. *p* schwarz, mit breiten, hellrotgelben Tarsen. Hinterleib rein schwarz, ohne jede Spur von Rotgelb oder Gelbbraunfärbung *C. palliditarsis* Krb., ♀.
 Untergesicht mit silberweissem Glanz. Thorax ohne weissen Mittelstreif 5.
 5. *p* gelbbraun *C. velutinus* Krb., ♂.
p und Hüften ganz rotgelb *C. brunneosericeus* [Krb., ♀].
 6. Grosse, tiefschwarze Art von 18–25 mm. mit schwarzbrauner Flügelstrieme. Die Basis des 3. Segments ist etwas gelbbraun *C. magnus* Will., ♂♀.
 Kleine, schwächliche Arten von höchstens 13 mm. Grenze des 2. und 3. Segments immer deutlich gelbbraun gefärbt 7.

7. Kleine Art von 8 mm mit auffallend
schmäler Stirn. Schildchen dicht gelb
tomentiert [Krb., ♀.
C. aureoscutellatus
Art von 12–13 mm. mit breiterer Stirn und
schwarzem Schildchen *C. sequax* Will., ♂♀.

Von den nachzuprüfenden *Conops* lassen sich folgende
in eine provisorische Tabelle bringen:—

- | | |
|--|---|
| 1. Stirn ganz schwarz | 2. |
| Stirn ganz oder teilweise gelb oder gelb-
braun | 5. |
| 2. Untergesicht ganz schwarz. Flügelstrieme
bis zur 3. Längsader | <i>C. formosus</i> Krb., ♂. |
| Untergesicht ganz oder teilweise gelb, wenn
auch oft verdunkelt | 3. |
| 3. Die Flügelbinde reicht nur bis zur 3. Längs-
ader. 1. Hinterrandzelle schwärzlich ge-
wölkt. Stirn mattschwarz. Brustseiten
mit deutlicher Strieme | <i>C. anthus</i> Will., ♂♀. |
| Die Flügelbinde reicht darüber hinaus .. | 4. |
| 4. Flügel vor der Spitze mit einer hyalinen
Querbinde | <i>C. sylvosus</i> Will., ♂♀. |
| Flügel ohne Querbinde. Kleine Art von
9 mm. 1. Hinterrandzelle absolut hyalin. | <i>C. mexicanus</i> Krb., ♂. |
| 5. Stirn ohne Mittelstrieme. Flügel zwischen
der 4. und 5. Längsader hellbraun bis
schwarzbraun. Letzte Abdominalseg-
mente vorherrschend schwarz. Theka
gross, hornförmig ♂ 13–18 mm., ♀ 12–
23 mm. | <i>C. excisus</i> Wied., ♂♀. |
| Stirn mit schwarzer Mittelstrieme | 6. |
| 6. Die Flügelbinde reicht bis zur 4. Längsader.
Die Binde reicht bis zur 3. Längsader.
Stirn des ♀ breit quengerunzelt, fast ganz
durch die schwarze Strieme ausgefüllt .. | <i>C. soror</i> Krb., ♀.
<i>C. pictifrons</i> Krb., ♀. |

Conops pictus F. liegt vor von S. Domingo.

Conops magnus Will. vom N. Yucatan.

Conops sequax Will. von N. Yucatan.

Phrysoconops Szil.

- | | |
|--|------------------------------|
| 1. Flügelbinde wenigstens an der Basis
leuchtend rostrot | 2. |
| Flügelbinde braun oder schwarzbraun | 3. |
| 2. 3. Fühlerglied brennend rotgelb. Theka
blass gelbbraun | <i>P. pictus</i> F., ♂♀. |
| 3. Fühlerglied ganz schwarz (♀) oder doch
an der Innenseite schwarz (♂) | 3 a. [♂♀. |
| 3 a. Kopf rotgelb. Theka tiefschwarz. | <i>P. rufipennis</i> Macq., |
| Stirn und Scheitel schwarz. Flügelbinde
reicht bis r_3 und <i>vena spuria</i> | <i>P. perbellum</i> Krb., ♂. |
| 3. Flügelstrieme die Spitze der Unterrand-
zelle nicht erreichend | <i>P. abruptus</i> Krb., ♂♀. |
| Flügelstrieme die Unterrandzelle ganz
ausfüllend | 4. |
| 4. Untergesicht schwarz, die Gruben der
Länge nach gelb, gleich dem Augenrand | |

- wunderbar silberglänzend. Theka gross, dornförmig. Grosse, robuste Art, 13–15 mm. *P. costaricensis* Krb., ♀.
- Untergesicht vorherrschend gelb 5.
5. Stirn schmaler als hoch *P. angustifrons* Will., ♀♂
- Stirn so breit als hoch oder breiter 6.
6. Scheitel mit 2 isolierten gelben Tomentflecken *P. ornatifrons* Krb., ♂♀.
- Scheitel ohne solche Tomentflecken 7.
7. 3. Fühlerglied deutlich kürzer als das 2. ... *P. discalis* Will., ♂♀.
3. Fühlerglied so lang wie das 2. 8.
8. Stirn glänzend schwarz. Scheitel schwarz.
1. Basalzelle und Raum unterhalb der *vena spuria* deutlich braun tingiert.
- Grosse, robuste Art von 15–17 mm. *P. bulbirostris* Lw., ♂♀.
- Stirn gelb, event. mit schwarzer Längstrieme 9.
9. Stirn mit schwarzer Strieme. 1. Basalzelle und Raum unterhalb der *vena spuria* absolut hyalin. 10–13 mm. *P. gracilior* Krb., ♂♀.
- Stirn ohne Längstrieme 10.
10. Vorherrschend glänzend blass rotgelbe Art.
3. Fühlerglied breiter als das erste oder zweite, kaum länger als das erste. *p* blass rotgelb. Spitze der *t*₃ und die Tarsen schwarz. Augen am Hinterrand mit kleinem, eingedrücktem, glänzendem Dreieck *P. fronto* Will., ♂♀.
- Vorherrschend schwarze Art von 18–26 mm., bei der die Schillerstrieme am hintern Augenrand quer über die Scheitelblase verläuft. Flügel zwischen der 4. und 5. Längsader hyalin. Letzte Hinterleibssegmente fast vollkommen intensiv goldgelb tomentiert. Theka klein, breit. *P. auratus* Towns., ♂♀.
- P. angustifrons* Will. liegt vor von Theresopolis 9, 10, Omilteme–Guerrero und Teapa–Tabasco II. 3 ♂♂.
- P. ornatifrons* Krb. vom Amazonas, 1 ♂.
- P. abruptus* Krb. (?) von Xucumanatlan in Guerrero VII.
- P. rufipennis* Macq. von Argentinien.
- P. gracilior* Krb. (?) von Brasilien, Nova Teutonia.

Physoconops perbellum, sp. n., ♂.

Hat grosse Ähnlichkeit mit *Ph. rufipennis* Macq. (meiner Auffassung), hat aber tiefschwarze Stirn. Länge 13 mm. Fühler 3 mm.; Flügellänge 9 mm., -breite 2·5 mm.

Stirn und Scheitel schwarz. Über dem ziemlich hohen, gelben Fühlerhöcker liegt ein glänzend schwarzer halbkreisförmiger Fleck von gleicher Breite, der bis zu den deutlichen Ozellen hinaufreicht. Der Rest ist dicht goldgelb tomentiert. Scheitelblase glänzend schwarzbraun. Hinterkopf glänzend schwarz, am Augenrand

breit silbern eingefasst. Untergesicht dunkelgelb mit schwärzlichen Partien, aber alles unter dichtem, goldgelbem Toment verborgen. Kiel gelb. Vom Scheitel steigen 2 feine schwarze Linien neben den Fühlern herab. Backen schwarz. Fühler schwarz. 1. Glied düster rotgelb, ca. 4 mal so lang wie breit; 2. ca. $1\frac{1}{2}$ mal so lang wie das 1., dicht, kurz, schwarz beborstet; 3. gleich dem 1. Endgriffel dreigliedrig mit langer Borste. Thorax, Schildchen, Hinterrücken, Pleuren schwarz, mit feinem, weissem Toment. Hüften z. T. warm rotgelb, dicht goldgelb tomentiert. *p* leuchtend rotgelb. Tarsen vom 2. bezw. 3. Glied an schwarzbraun. Schwinger rotgelb, Knöpfchen braun. Flügel hyalin, zwischen Costa und r_3 bezw. *vena spuria* rotgelb, gegen die Spitze zu braun tingiert. Adern der Basalhälfte rotgelb. Unterrandzelle in der Spitzenpartie subhyalin. Hinterleib sehr schmal gestielt. 1. Segment schwarz, am Ende gleich dem 2. und der Basalhälfte des 3. leuchtend rotgelb; der Rest schwarz; Toment zart, weiss.

Argentinien, Buenos Aires; 1. 4. Type: Mus. Berlin.

(To be continued.)

XXXVI.—*Ambrosia Beetles from Copal* (Scolytidæ and Platypodidæ).—62nd Contribution. By KARL E. SCHEDL.

THE Keeper of the Geological Department of the British Museum (Natural History) has kindly given me the opportunity of examining a series of copal-inclusa. The species found are all typical of the Ethiopian region. Two species are new to science, but undoubtedly they will be found eventually in living trees.

Xyleborus alluaudi Schauf. is represented by several specimens in the inclusa (58564, 58597, 58642, 58646).

A very interesting piece (In. 37137) contains a large number of specimens. Examination of the species enclosed in this piece of resin is difficult, partly on account of its size. However, eight species can be named with fair certainty. These are: *Platypus solutus* Schedl, *Crossotarsus tenuis* Strohm., *Xyleborus amanicus* Hag., *X. alluaudi* Schauf., *X. xanthopus* Eichh., *X. confusus* Eichh., *X. ferrugineus* F., *X. testaceus* Walk.

58644 contains 4 ♂♂ and 3 ♀♀ of *Crossotarsus crinitus* Chap., In. 18205 one male of *Crossotarsus tenuis* Strohm, the latter in rather poor condition.

Xyleborus resinosus, sp. n.

When mature, dark brown, 3·4 mm. long, of the same general appearance as *X. alluaudi* Schaef. but more slender, the elytra distinctly narrower than the pronotum, the elytral interstices but very minutely punctated, the punctations hardly visible in all specimens; the punctations in each row increase in size, and the interspaces between them decrease in width from the base towards the declivital convexity; the elytra more cylindrical, the declivity shorter and more oblique, the tubercles of the latter decidedly smaller.

Front convex, sparsely but rather coarsely punctated.

Pronotum as long as wide, base transverse, posterolateral angles rectangular, somewhat rounded, sides feebly arcuate, subparallel on the basal half, broadly rounded in front; summit in the middle, anterior area finely asperate, moderately convex, posterior area horizontal, sparsely punctated. Scutellum small, triangular. The sides of the pronotum are rather acutely margined.

Elytra slightly narrower than, and 1·8 times as long as, the pronotum, sides parallel on the basal three-fifths, apex at first oblique, at the tip rather narrowly rounded, declivity commencing behind the middle, oblique, apical margin acute and finely serrate up to the seventh interstice; disc striate-punctate, interstices each with a row of very fine and indistinct punctations, declivity (as far as visible) with a row of small tubercles on each interspace.

Types in the Geological Department of the British Museum (Nat. Hist.):—

In. 18252 contains 18 specimens all more or less immature and with excellently preserved boring-dust.

58627 (13 specimens), some of them mature (dark brown). It is also possible that the dark specimens are beetles which have already produced one brood and are still alive when their children have reached maturity. Holotype, an individual to the left of a mass of boring-dust.

In. 18203 (2 specimens), In. 18204 (parts of one specimen).

The crowded assemblage of specimens, connected with the mass of boring-dust, I am inclined to hold as proof that the beetles hastened to leave their host-tree before they became entangled in the flowing resin.

Xyleborus pseudocrucifer, sp. n.

Brown, 5.1 mm. long, distinguished from *X. crucifer* Hag. by the following characters: smaller, summit of the pronotum somewhat farther behind, punctation of the basal area not as deep, elytra with the declivity commencing farther behind, therefore steeper, the transverse depression of the disc decidedly longer, apparently shallower, the longitudinal depression of the declivity shallow, the lateral convexities lower, the tubercles smaller, and the large ones on the third interstices, just above the middle, lacking.

Front plano-convex, as far as visible rather densely punctated.

Pronotum subquadrate, postero-lateral angles rectangular, feebly rounded, sides parallel on the basal half, broadly rounded in front, summit somewhat behind the middle, anterior area very densely and finely asperate, posterior area rather shallowly punctated, but the punctations are rather densely placed. Scutellum large, apparently longer than wide. Pubescence inconspicuous.

Elytra with the disc smooth, as if polished, with fine rows of small closely-placed punctations, the interstices very wide and flat, irregularly and more than biserially punctated, the punctations but little finer than those of the striae, in the transverse depression the punctation is more crowded and the arrangement less distinct; at the commencement of the declivital sulcus with one to two (one on one side, two on the other) sharp but small spines, on the third interstice with a row of 5-6 small granules in the upper half of the declivital convexity, and with 1-2 larger ones far below, the fourth interstice with several granules throughout, the outer interstices similar but the granules minute. Apart from the tubercles small punctations are irregularly scattered over all interstices; these are more numerous near the dorsal transverse depression. Pubescence rather distinct and

long, but not very conspicuous on the declivity. The apical margin is not acute but well marked by the presence of the last granules of the interstices.

Type in the Geological Department of the British Museum (Natural History), 58647.

XXXVII.—*The Piaget Collection of Mallophaga.*

—Part VIII. By GORDON B. THOMPSON.

[Concluded from p. 144.]

IN the seven previous papers dealing with the Piaget collection of Mallophaga I have listed all the material contained in Piaget's original collection, which is at present housed in the British Museum and the Leiden Museum. Originally I intended giving a list of the species described by Piaget of which no specimens have been found, but this seems unnecessary, as it may be taken for granted that the specimens are missing if the species is not mentioned in the list of material in the British Museum or the Leiden Museum. It will, however, become evident to anyone who uses these lists that there are quite a number of specimens missing. As to the present whereabouts of the missing material, I have been unable to obtain any useful information in spite of numerous efforts.

One interesting fact did emerge from my prolonged efforts to locate the missing Piaget material. In the introduction to both volumes of his work Piaget mentioned a certain Mr. Hyslop of Edinburgh from whom he received material. Some of the specimens which Piaget stated as having been received from this collector are missing from his collection. I have endeavoured to obtain some information regarding Mr. Hyslop, but have been unsuccessful. Andrew Murray, in his paper "On the Pediculi infesting the different Races of Man" (Trans. Roy. Soc. Edinb. 1861, xxii. iii. p. 568), writes:—"The Rev. Mr. Hislop, known as well for his scientific as for his missionary labours in India. . ."; and I take it that this is the person referred to by Piaget.

Professor E. Brumpt, in reply to my enquiries re the missing Piaget specimens, informed me that he had a collection of Mallophaga, which had been bought from a Mr. Hyslop of Edinburgh, at the Laboratoire de

Parasitologie of the University of Paris, and that he was willing to sell it to the British Museum. The collection was sent to the British Museum, and ultimately purchased by the authorities of this institution. On going through this collection I discovered the type-series of three of Piaget's species.

The specimens were all labelled, but not in Piaget's handwriting. The type-specimens bore the word "new" within brackets after the name and author of the species. The following is a list of these type-specimens:—

Species.	No. of specimens in Brit. Mus.*	No. of slides.	Hosts.
<i>Colpocephalum pilosum</i> Piaget...	2 ♂♂, 1 ♀	2	<i>Chauna chavaria</i> . Crested Screamer.
<i>Goniocotes bifasciatus</i> Piaget....	1 ♂, 2 ♀♀	3	<i>Spheniscus magellanicus</i> . Penguin.
<i>Nirmus deficiens</i> Piaget.....	3 ♂♂, 2 ♀♀	2	Spanish Blue Magpie.

It seems extremely probable that Piaget examined the greater part, if not the whole, of Hyslop's collection.

List of the published Works of Piaget on Mallophaga which refer to his Collection.

1. "Description de quelques parasites du genre *Docophorus*." Tijdschr. Ent. xiv. 1871, pp. 113-137 (with two plates).
2. "Description du *Nirmus asymmetricus* Nitzsch." Tijdschr. Ent. xx. 1877, pp. 80-84 (with one plate).
3. "Acidoproctus." Tijdschr. Ent. xxi. 1878, pp. 178-184 (with one plate).
4. "Les Pédiculines." Essai Monographique, Leide, E. J. Brille, 1880. One volume of text, xxxix and 114 pp., with an atlas of 56 plates.
5. Supplément, 1885. Text, xii and 162 pp., with 17 plates.
6. "Quatre nouvelles Pédiculines." Tijdschr. Ent. xxiv. 1881, pp. 1-6 (with one plate).
7. "Quelques Pédiculines nouvelles ou peu connues." Tijdschr. Ent. xxvi. 1883, pp. 152-158 (with one plate).
8. "Description d'une nouvelle Pédiculine." Notes from the Leyden Museum, vi. 1884, pp. 111-113.
9. "Quelques nouvelles Pédiculines." Tijdschr. Ent. xxxi. 1888, pp. 147-164 (with two plates).
10. "Description d'une nouvelle Pédiculine." Notes from the Leyden Museum, xi. 1889, pp. 35-36 (with figures).
11. "Quelques Pédiculines nouvelles." Tijdschr. Ent. xxxiii. 1890, pp. 223-259 (with three plates).
12. "Une nouveau parasite du Transvaal." Tijdschr. Ent. xxxviii. 1895, pp. 101-102.

* I am indebted to Miss T. Clay for checking up the details of these specimens for me.

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[ELEVENTH SERIES.]

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XXXVIII.—*Further Records of Parasitic Worms from British Vertebrates.* By H. A. BAYLIS, M.A., D.Sc., Department of Zoology, British Museum (Natural History).

ELEVEN years ago the writer (1928) published a list of helminths obtained, in the course of routine work, from vertebrates in the British Isles. Since the publication of that list a great deal more material has been accumulated, and it seems desirable to publish a supplementary list of records. As in the former list, a considerable proportion of these are the result of the examination of the bodies of birds handed over by Mr. A. H. Bishop. The dissection of these, and the collection and preservation of the worms, have been largely carried out by Mr. S. Prudhoe, who has also given much help in the determination of the species.

Parasites obtained from domestic animals, or from animals in captivity, are omitted; but certain forms from hosts that are not native, but have been introduced and have become established in the British fauna, are included. The names of such hosts are marked with an asterisk. For the sake of completeness, the present list includes the parasites from marine fishes already recorded by Baylis and Jones (1933).

Some changes in the nomenclature both of parasites and of hosts have become necessary. The names used for hosts in the present list are those used in the 'List of British Vertebrates' by Hinton, Tucker, Parker and

Norman, published by the British Museum (Natural History) in 1935. Where a parasite has assumed a name different from that used in the 1928 list, the superseded name is given in square brackets. This is not done for the hosts, whose vernacular names will generally be found unchanged. No attempt is made here to catalogue all the minor changes that should be made in the 1928 list, but a few important *corrigenda* are mentioned at the end.

TREMATODES.

Acanthocotyle ? lobianchi Monticelli, 1888.

Flapper skate (*Raja batis*), S. Devon.

Allocreadium isoporum (Looss, 1894).

Roach (*Rutilus rutilus*), Cambridgeshire, June ; Chub (*Squalius cephalus*), Berkshire, June.

Apatemon [Strigea] gracilis (Rudolphi, 1819).

Wigeon (*Mareca penelope*), Cheshire.

Axine belones Abildgaard, 1794.

Gar-fish (*Belone belone*), S. Devon.

Bolbophorus confusus (Krause, 1914) (?).

Shag (*Phalacrocorax aristotelis*), London, February.

Brachylæmus [Harmostomum] fuscatus (Rudolphi, 1819).

Starling (*Sturnus vulgaris*), London, June ; "Thrush," Cambridgeshire, February ; Song-thrush (*Turdus ericetorum*), Cambridgeshire, June ; Jay (*Garrulus glandarius*), Hampshire and Worcestershire, October and November ; Wood-pigeon (*Columba palumbus*), December.

Bucephalopsis gracilescens (Rudolphi, 1819).

Angler (*Lophius piscatorius*), S. Devon, May ; Conger (*Conger conger*), S. Devon, May.

Bucephalus polymorphus Baer, 1827.

Pike (*Esox lucius*), Wiltshire and Berkshire, October.

Bunodera lucioperce (Müller, 1776).

Perch (*Perca fluviatilis*), Hertfordshire, September.

Calicotyle kroyeri Diesing, 1850.

"Skate," Durham ; Spotted ray (*Raja montagui*), S. Devon, May.

Capsala [Tristomum] ? nozawæ (Goto, 1894).

Tunny (*Thunnus thynnus*), North Sea, August.

Catatropis verrucosa (Frölich, 1789).

Shelduck (*Tadorna tadorna*), Norfolk, April; Pink-footed goose (*Anser brachyrhynchus*), Norfolk, December, and Gloucestershire, February; Brent goose (*Branta bernicla*), Gloucestershire, March; Shoveller (*Spatula clypeata*), Shropshire, December; Long-tailed duck (*Clangula hyemalis*), Hebrides, March; Common scoter (*Melanitta nigra*), Lincolnshire, February; Grey plover (*Squatarola squatarola*), Norfolk December.

Cercorchis nematoides (Mühling, 1898).

Grass-snake (*Natrix natrix*), Cambridgeshire, May.

Cotylurus cornutus (Rudolphi, 1808).

Mute swan (*Cygnus olor*), Cambridgeshire, October.

Cotylurus platycephalus (Creplin, 1825).

Razorbill (*Alca torda*), Middlesex, October.

Crassiphiala denticulata (Rudolphi, 1819).

Kingfisher (*Alcedo atthis*), Herefordshire, September, and Shropshire, February.

Crepidostomum farionis (Müller, 1784).

Brown trout (*Salmo trutta*), Hampshire, November.

Cryptocotyle concava (Creplin, 1825).

Tufted duck (*Nyroca fuligula*), Dorset, February; Golden-eye (*Glaucionetta clangula*), Hampshire, January; Shag (*Phalacrocorax aristotelis*), Dorset, September; Heron (*Ardea cinerea*), Inner Hebrides, January; Red-throated diver (*Colymbus stellatus*), Oxfordshire, February.

Cyathocotyle ? prussica Mühling, 1896.

Shag (*Phalacrocorax aristotelis*), London, February.

Dactycotyle denticulata (Olsson, 1876).

Hake (*Merluccius merluccius*), S. Devon.

Dactycotyle merlangi (Kuhn, 1829).

Whiting (*Gadus merlangus*), S. Devon.

Dactycotyle phycidis Parona & Perugia, 1889.

Greater fork-beard (*Urophycis blennoides*), S. Devon.

Derogenes varicus (Müller, 1784).

Whiting (*Gadus merlangus*), S. Devon, May; Hake (*Merluccius merluccius*), S. Devon, May; Yellow gurnard (*Trigla lucerna*), S. Devon, May; Red gurnard (*Trigla cuculus*), S. Devon; Angler (*Lophius piscatorius*), S. Devon, May; Sea-scorpion (*Cottus bubalis*), S. Devon.

Didymozoon faciale Baylis, 1938.

Mackerel (*Scomber scombrus*), Devon and Cornwall, May, July, October and November.

Didymozoon scombri (Taschenberg, 1879).

Mackerel (*Scomber scombrus*), Devon and Cornwall, March and November.

Diplodiscus subclavatus Goeze, 1782).

Common frog (*Rana temporaria*), Cambridgeshire, February.

Diplostomum [*Hemistomum*] *excavatum* (Rudolphi, 1803).

Bittern (*Botaurus stellaris*), Norfolk, December.

Diplostomum ? *parviventosum* Dubois, 1932.

Goosander (*Mergus merganser*), Berkshire, October.

Diplostomum pileatum (Brandes, 1888).

Razorbill (*Alca torda*), Middlesex, October.

Diplostomum [*Hemistomum*] *spathaceum* (Rudolphi, 1819).

Adult : Black-headed gull (*Larus ridibundus*), Middlesex, October, and London, February ; Goosander (*Mergus merganser*), Aberdeenshire, December.

Larva : *Rainbow trout (*Salmo irideus*), Somerset, February.

Echinochasmus ? *amphibolus* Kotlan, 1922.

Bittern (*Botaurus stellaris*), Norfolk, December.

Echinochasmus ? *coaxatus* Dietz, 1909.

Great crested grebe (*Podiceps cristatus*), Gloucestershire, April.

Echinoparyphium recurvatum (v. Linstow, 1873).

Goosander (*Mergus merganser*), Aberdeenshire, December.

Echinostoma ? *chloropodis* (Zeder, 1800).

Water-rail (*Rallus aquaticus*), Norfolk, December.

Echinostoma revolutum (Frölich, 1802).

Bean-geese (*Anser fabalis*), Norfolk, January ; Shoveller (*Spatula clypeata*), N. Wales, December.

Entobdella soleæ (v. Beneden and Hesse, 1864).

Sole (*Solea solea*), S. Devon, May.

Fasciola hepatica Linnæus, 1758.

Rabbit (*Oryctolagus cuniculus*), Westmorland ; Hampshire, December ; Yorkshire, January.

Galactosomum lacteum (Jägerskiöld, 1896).

Shag (*Phalacrocorax aristotelis*), Dorset, September ; Heron (*Ardea cinerea*), Inner Hebrides, January.

Gastrocotyle trachuri v. Beneden & Hesse, 1863.

Horse-mackerel (*Trachurus trachurus*), S. Devon, November.

Gorgoderina vitelliloba (Olsson, 1876).

Common toad (*Bufo bufo*), Hertfordshire, April.

Gymnophallus deliciosus (Olsson, 1893).

Herring-gull (*Larus argentatus*), Kent, September.

Haplometra cylindracea (Zeder, 1800).

Common frog (*Rana temporaria*), Cambridgeshire, May.

Helicometra fasciata (Rudolphi, 1819).

Gilt-head (*Crenilabrus melops*), S. Devon, May.

Helicometra pulchella (Rudolphi, 1819).

Yellow gurnard (*Trigla lucerna*), S. Devon ; Red gurnard (*Trigla cuculus*), S. Devon ; Streaked gurnard (*Trigla lineata*), S. Devon, May ; Comber (*Serranus cabrilla*), S. Devon.

Hemipera ovocaudata Nicoll, 1913.

Five-bearded rockling (*Onos mustelus*), S. Devon ; Three-bearded rockling (*Onos tricirratus*), S. Devon.

Hemiurus communis Odhner, 1905.

Conger (*Conger conger*), S. Devon, May ; Whiting (*Gadus merlangus*), S. Devon, May ; Ling (*Molva molva*), S. Devon, May ; Streaked gurnard (*Trigla lineata*), S. Devon, May ; Father lasher (*Cottus scorpius*), S. Devon ; Angler (*Lophius piscatorius*), S. Devon, May.

Hexacotyle ? *acuta* Goto, 1894.

Tunny (*Thunnus thynnus*), North Sea, August.

Himasthla leptosoma (Creplin, 1829).

Dunlin (*Erolia alpina*), S. Scotland, January ; Bar-tailed godwit (*Limosa lapponica*), East Lothian, September, and Norfolk, December.

Hypoderæum conoideum (Bloch, 1782).

Mallard (*Anas platyrhynchos*), July ; Tufted duck (*Nyroca fuligula*), Staffordshire, March.

Lebouria varia Nicoll, 1910.

Common dragonet (*Callionymus lyra*), S. Devon, May ; Cuckoo wrasse (*Labrus mixtus*), S. Devon, May ; Ballan wrasse (*Labrus bergylla*), S. Devon.

Lecithaster gibbosus (Rudolphi, 1802).

Red band-fish (*Cepola rubescens*), S. Devon, May.

Lecithochirium gravidum Looss, 1907.

Conger (*Conger conger*), S. Devon, May.

Lecithochirium rufoviride (Rudolphi, 1819).

Conger (*Conger conger*), S. Devon, May; Angler (*Lophius piscatorius*), S. Devon.

Lecithocladium excisum (Rudolphi, 1819).

Mackerel (*Scomber scombrus*), S. Devon, May.

Lecithodendrium chilostomum (Mehlis, 1831).

Pipistrelle (*Pipistrellus pipistrellus*), Cambridgeshire, December.

Lecithodendrium lagena (Brandes, 1888).

Pipistrelle (*Pipistrellus pipistrellus*), Cambridgeshire, December.

Lepoderma ? cirratum (Rudolphi, 1802).

Black-headed gull (*Larus ridibundus*), London, February.

Lepoderma maculosum (Rudolphi, 1802).

Swift (*Micropus apus*), Kent, June.

Lepoderma mentulatum (Rudolphi, 1819).

Common frog (*Rana temporaria*), Cambridgeshire, May.

Lepoderma ? muris Tanabe, 1922.

Brown rat (*Rattus norvegicus*), Cambridgeshire, November.

Lepoderma notabile (Nicoll, 1909).

Pied wagtail (*Motacilla yarrellii*), Cumberland, June.

Lepoderma vespertilionis (Müller, 1784).

Pipistrelle (*Pipistrellus pipistrellus*), Cambridgeshire, December; Greater horseshoe bat (*Rhinolophus ferrum-equinum*), Somerset, December.

Leptocotyle minor (Monticelli, 1888).

Rough hound (*Scyliorhinus caniculus*), S. Devon.

Leptophallus nigrovenosus (Bellingham, 1844).

Grass-snake (*Natrix natrix*), Cambridgeshire, May.

Levinseniella brachysoma (Creplin, 1837).

Turnstone (*Arenaria interpres*), N. Wales, December; Grey plover (*Squatarola squatarola*), Norfolk, December; Ringed plover (*Charadrius hiaticula*), Dorset, January; Dunlin (*Erolia alpina*), S. Scotland, January; Shelduck

(*Tadorna tadorna*), Norfolk, April; Short-eared owl (*Asio flammeus*), Norfolk, November.

Levinseniella propinqua Jägerskiöld, 1907.

Turnstone (*Arenaria interpres*), N. Wales, December; Tufted duck (*Nyroca fuligula*), Dorset, February; Goldeneye (*Glaucionetta clangula*), Hampshire, January.

Macrodera longicollis (Abildgaard, 1788).

Grass-snake (*Natrix natrix*), Cambridgeshire, May.

Maritrema graciosum Nicoll, 1907.

Dunlin (*Erolia alpina*), S. Scotland, January; Bar-tailed godwit (*Limosa lapponica*), January; Common scoter (*Melanitta nigra*), Lincolnshire, February.

Maritrema subdolum Jägerskiöld, 1908.

Tufted duck (*Nyroca fuligula*), Dorset, February.

Mazocraës alosæ Hermann, 1782.

Twaite shad (*Alosa finta*), S. Devon.

Mazocraës harengi (v. Beneden & Hesse, 1864).

Allis shad (*Alosa alosa*), S. Devon.

Mazocraës [*Octobothrium*] *sagittatum* (Leuckart, 1842).

Brown trout (*Salmo trutta*), Yorkshire, July.

Mazocraës [*Octobothrium*] *scombri* (Kuhn, 1829).

Mackerel (*Scomber scombrus*), S. Devon, May.

Mesodendrium granulosum (Looss, 1907).

Pipistrelle (*Pipistrellus pipistrellus*), Cambridgeshire, December.

Metorchis ? *xanthosomus* (Creplin, 1846).

Carrion crow (*Corvus corone*), Surrey, June; Razorbill (*Alca torda*), Middlesex, October.

Microbothrium apiculatum Olsson, 1869.

Piked dogfish (*Squalus acanthias*), Orkneys, July.

Nematostrigea serpens (Nitzsch, 1819).

Osprey (*Pandion haliaetus*), May.

Neodiplostomum [*Diplostomum*] *cuticola* (Nordmann, 1832).

Rudd (*Scardinius erythrophthalmus*), Norfolk, September.

Notocotylus attenuatus (Rudolphi, 1809).

Wigeon (*Mareca penelope*), Cheshire; Shoveller (*Spatula clypeata*), Shropshire, December.

Notocotylus ? gibbus (Mehlis, 1846), Kossack, 1911.

Moorhen (*Gallinula chloropus*), Argyllshire ; [England], November.

Notocotylus noyeri Joyeux, 1922.

Short-tailed vole (*Microtus hirtus*), Cambridgeshire, December.

Notocotylus quinqueserialis Barker & Laughlin, 1911.

*Musk-rat (*Ondatra zibethica*), R. Severn, October.

Notocotylus ralli Baylis, 1936.

Water-rail (*Rallus aquaticus*), Perthshire, December ; Norfolk, December ; Sussex, September.

Onchocotyle appendiculata (Kuhn, 1829).

"Skate," Durham ; Thornback ray (*Raja clavata*), S. Devon, May ; Blonde (*Raja brachyura* [*R. blanda*]), S. Devon, May ; Long-nosed skate (*Raja oxyrhynchus*), S. Devon ; Flapper skate (*Raja batis*), S. Devon ; Rough hound (*Scyliorhinus caniculus*), S. Devon.

Opisthioglyphe rastellus (Olsson, 1876).

Common frog (*Rana temporaria*), Cambridgeshire, March ; Common toad (*Bufo bufo*), Hertfordshire, March.

Paramonostomum alveatum (Mehlis, 1846).

Tufted duck (*Nyroca fuligula*), Dorset, February ; Common scoter (*Melanitta nigra*), Lincolnshire, February ; Brent goose (*Branta bernicla*), Gloucestershire, March.

Petasiger exaeretis Dietz, 1909.

Cormorant (*Phalacrocorax carbo*), Scilly Is., December.

"*Petasiger*" *neocomense* Fuhrmann, 1927 (?).

Little grebe (*Podiceps ruficollis*), Hampshire, December.

Phyllodistomum folium (v. Olfers, 1816).

Three-spined stickleback (*Gasterosteus aculeatus*), Cambridgeshire, February.

Platynosomum clathratum (Deslongchamps, 1824).

Swift (*Micropus apus*), Kent, June.

Platynosomum petiolatum (Railliet, 1900).

Jay (*Garrulus glandarius*), Hampshire and Wiltshire, October and November ; Green woodpecker (*Picus viridis*), October ; Stone-curlew (*Edicnemus edicnemus*), Cambridgeshire (?), October.

Pleurogenes claviger (Rudolphi, 1819).

Common frog (*Rana temporaria*), Cambridgeshire, May.

Plurogenes medians (Olsson, 1876).

Common frog (*Rana temporaria*), Cambridgeshire, May.

Podocotyle atomon (Rudolphi, 1802).

Sea-scorpion (*Cottus bubalis*), S. Devon, May.

Podocotyle reflexa (Creplin, 1825).

Fifteen-spined stickleback (*Spinachia spinachia*), S. Devon, May; Three-bearded rockling (*Onos tricirratus*), S. Devon.

Podocotyle syngnathi Nicoll, 1913.

Ocean pipe-fish (*Entelurus æquoreus*), S. Devon, May.

Polystoma integerrimum (Frölich, 1791).

Common frog (*Rana temporaria*), Cambridgeshire, November.

Prosorhynchus aculeatus Odhner, 1904.

Conger (*Conger conger*), S. Devon, May.

Prosorhynchus crucibulum (Rudolphi, 1819).

Conger (*Conger conger*), S. Devon, May.

Prosthogonimus ovatus (Rudolphi, 1803).

Carrion crow (*Corvus corone*), Surrey, March.

Pseudaxine trachuri Parona & Perugia, 1890.

Horse-mackerel (*Trachurus trachurus*), S. Devon, November.

Psilochasmus oxyurus (Creplin, 1825).

Tufted duck (*Nyroca fuligula*), Dorset, February.

Psilostomum brevicolle (Creplin, 1829).

Oyster-catcher (*Hæmatopus ostralegus*), January; Lincolnshire, November; Norfolk, December; Common scoter (*Melanitta nigra*), Lincolnshire, February.

Ptychogonimus megastomus (Rudolphi, 1819).

Smooth hound (*Mustelus mustelus*), S. Devon.

Pycnoporos heteroporus (Dujardin, 1845).

Pipistrelle (*Pipistrellus pipistrellus*), Cambridgeshire, December.

Pycnoporos macrolaimus (v. Linstow, 1894).

Pipistrelle (*Pipistrellus pipistrellus*), Cambridgeshire, December.

Rhipidocotyle minima (Wagener, 1852).

Red gurnard (*Trigla cuculus*), S. Devon, May; Yellow gurnard (*Trigla lucerna*), S. Devon, May.

Scaphanocephalus expansus (Creplin, 1842).

Osprey (*Pandion haliaetus*), May.

Sphærostoma bramæ (Müller, 1776).

Roach (*Rutilus rutilus*), Cambridgeshire, June.

Spelotrema claviforme (Brandes, 1888).

Ringed plover (*Charadrius hiaticula*), Dorset, January.

Spelotrema excellens Nicoll, 1907.

Herring-gull (*Larus argentatus*), Kent, September.

Spelotrema pygmæum (Levinsen, 1881).

Tufted duck (*Nyroca fuligula*), Dorset, February ; Common scoter (*Melanitta nigra*), Lincolnshire, February.

Stephanoprora spinosa Odhner, 1910.

Great crested grebe (*Podiceps cristatus*), Norfolk, September ; Gloucestershire, April.

Steringophorus furciger (Olsson, 1868).

Dab (*Limanda limanda*), S. Devon, May.

Steringotrema cluthense Nicoll, 1909.

Lemon sole (*Microstomus kitt* [*Pleuronectes microcephalus*]), S. Devon, May ; Dab (*Limanda limanda*), S. Devon, May.

Steringotrema divergens (Rudolphi, 1809).

Butterfly blenny (*Blennius ocellaris*), S. Devon, May.

Sterrhurus fusiformis (Lühe, 1901).

Conger (*Conger conger*), S. Devon ; Angler (*Lophius piscatorius*), S. Devon.

Strigea falconis Szidat, 1928.

Iceland falcon (*Falco rusticolus islandus*), Argyllshire, March ; Montagu's harrier (*Circus pygargus*), Suffolk, May.

Strigea ? strigis (Schränk, 1788).

Short-eared owl (*Asio flammeus*), Norfolk, November.

Synaptobothrium caudiporum (Rudolphi, 1819).

Brill (*Scophthalmus rhombus*), S. Devon ; Conger (*Conger conger*), S. Devon ; (?) Yellow gurnard (*Trigla lucerna*), S. Devon.

Tergestia acanthocephala (Stossich, 1887).

Mackerel (*Scomber scombrus*), S. Devon.

Tocotrema lingua (Creplin, 1825).

Shag (*Phalacrocorax aristotelis*), Dorset, September ; Glaucous gull (*Larus hyperboreus*), Norfolk, November.

Zoogonoides viviparus (Olsson, 1860).

Common dragonet (*Callionymus lyra*), S. Devon, May ;
Lemon sole (*Microstomus kitt* [*Pleuronectes microcephalus*]),
S. Devon, May ; Plaice (*Pleuronectes platessa*), S. Devon,
May.

Zoogonus ? *rubellus* (Olsson, 1868).

Dab (*Limanda limanda*), S. Devon, May ; Cuckoo wrasse
(*Labrus mixtus*), S. Devon, May.

CESTODES.

Acanthobothrium coronatum (Rudolphi, 1819).

Nurse hound (*Scyliorhinus stellaris*), S. Devon, May.

Andrya cuniculi (Blanchard, 1891).

Rabbit (*Oryctolagus cuniculus*), Berkshire ; Gloucestershire,
December.

Anomotænia ægyptiaca (Krabbe, 1869) (?).

Woodcock (*Scolopax rusticola*), Denbighshire, December ;
Scilly Is., December ; Argyllshire, January ; N. Ireland,
February.

Anomotænia constricta (Molin, 1858).

Carrion-crow (*Corvus corone*), Surrey, March ; Song-thrush
(*Turdus ericetorum*), Cambridgeshire, May ; Blackbird (*Turdus*
merula), Buckinghamshire ; Isle of Wight, March.

Anomotænia depressa (v. Siebold, 1836).

Swift (*Micropus apus*), Kent, June ; Warwickshire, July.

Anomotænia micracantha (Krabbe, 1869) (?).

Herring-gull (*Larus argentatus*), Kent, September.

Anomotænia pyriformis (Wedl, 1855) (?).

Water-rail (*Rallus aquaticus*), Perthshire, December.

Anomotænia ? *stentorea* (Frölich, 1802).

Lapwing (*Vanellus vanellus*), Kent, April.

Anthobothrium auriculatum (Rudolphi, 1819) of Johnstone,
1906.

Blonde (*Raja brachyura*), S. Devon, May.

Aploparaksis ? *crassirostris* (Krabbe, 1869).

Jack-snipe (*Lymnocyptes minimus*), Lincolnshire, December.

Aploparaksis dujardinii (Krabbe, 1869).

Redwing (*Turdus musicus*), Isle of Wight, March ; Starling
(*Sturnus vulgaris*), Westmorland, May ; Kent, May.

Aploparaksis filum (Goeze, 1782).

Woodcock (*Scolopax rusticola*), Denbighshire, December ; Scilly Is., December ; Essex, December ; Lincolnshire, January ; Argyllshire, January ; N. Ireland, February ; Common snipe (*Capella gallinago*), Argyllshire ; Jack-snipe (*Lymnocyptes minimus*), Lincolnshire, December.

Aploparaksis pubescens (Krabbe, 1882).

Woodcock (*Scolopax rusticola*), Denbighshire, December ; Scilly Is., December ; N. Ireland, February.

Aporina delafondi (Railliet, 1892).

Turtle-dove (*Streptopelia turtur*), Isle of Wight, May.

Bothriocephalus claviceps (Goeze, 1782).

Eel (*Anguilla anguilla*), Hampshire ; Berkshire, June.

Bothriocephalus scorpii Müller, 1776 [*bipunctatus* Zeder, 1800].

Pollack (*Gadus pollachius*), S. Devon ; Sea-scorpion (*Cottus bubalis*), S. Devon, May and August ; Scald-fish (*Arnoglossus laterna*), S. Devon, May ; Norwegian topknot (*Phrynorhombus norvegicus*), S. Devon, May ; Brill (*Scophthalmus rhombus*), S. Devon, August ; Turbot (*Scophthalmus maximus*), S. Devon, August.

Calliobothrium verticillatum (Rudolphi, 1819).

Smooth hound (*Mustelus mustelus*), S. Devon, September.

Catenotænia dendritica (Goeze, 1782).

Red squirrel (*Sciurus vulgaris*), Westmorland, May ; Dumfriesshire, March.

Choanotænia coronata (Creplin, 1829).

Stone-curlew (*Edicnemus edicnemus*), Suffolk, September.

Choanotænia ? crateriformis (Goeze, 1782).

Great spotted woodpecker (*Dryobates major*), Surrey, May ; Green Woodpecker (*Picus viridis*), October.

Choanotænia infundibulum (Bloch, 1779).

Partridge (*Perdix perdix*), Suffolk.

Choanotænia ? paradoxa (Rudolphi, 1802) of Krabbe, 1869.

Woodcock (*Scolopax rusticola*), Denbighshire, December ; Kirkcudbrightshire, September ; Cumberland ; Inner Hebrides, January ; N. Ireland, February.

Choanotænia porosa (Rudolphi, 1810) of Meggitt, 1927.

Black-headed gull (*Larus ridibundus*), Middlesex, February and October.

Cittotænia denticulata (Rudolphi, 1804).

Rabbit (*Oryctolagus cuniculus*), Hertfordshire, January, September and November; Gloucestershire (?); Surrey, May; Cumberland, May; Westmorland, August; Cardiganshire, January.

Cittotænia pectinata (Goeze, 1782).

Rabbit (*Oryctolagus cuniculus*), Hertfordshire, January; Berkshire, December; Worcestershire, December; Gloucestershire (?); Cardiganshire, February.

Cyathocephalus truncatus (Pallas, 1781).

Brown trout (*Salmo trutta*), Hampshire, November and December; Eel (*Anguilla anguilla*), Hampshire, April.

Dilepus undula (Schränk, 1788).

Blackbird (*Turdus merula*), Essex, February; Westmorland, May; Middlesex, May; Hertfordshire, October; Song-thrush (*Turdus ericetorum*), Gloucestershire, February; Cambridgeshire, May and June; S. Wales, September; Missel-thrush (*Turdus viscivorus*), Lincolnshire (?), December; Redwing (*Turdus musicus*), Isle of Wight, March; Fieldfare (*Turdus pilaris*), Essex, January; Hertfordshire, January; Starling (*Sturnus vulgaris*), Westmorland, May; Kent, November; Rook (*Corvus frugilegus*), Westmorland, May; Aberdeenshire, December.

Diphyllobothrium ? *ditremum* (Creplin, 1825).

Red-breasted merganser (*Mergus serrator*), February.

Echeneibothrium tumidulum (Rudolphi, 1819) (?).

Thornback ray (*Raja clavata*), S. Devon, May; Spotted ray (*Raja montagui*), S. Devon.

Echinocotyle nitidulans (Krabbe, 1882).

Dunlin (*Erolia alpina*), Cheshire.

Fimbriaria fasciolaris (Pallas, 1781).

Long-tailed duck (*Clangula hyemalis*), Essex, September.

Grillotia erinaceus (v. Beneden, 1858).

Adult: Thornback ray (*Raja clavata*), S. Devon, May.

Larva: Whiting (*Gadus merlangus*), S. Devon; Conger (*Conger conger*), S. Devon; Brill (*Scophthalmus rhombus*), S. Devon, September.

Hymenolepis ? *collaris* (Batsch, 1786).

Mallard (*Anas platyrhynchos*), Norfolk.

Hymenolepis compressa (Linton, 1892).

Tufted duck (*Nyroca fuligula*), Staffordshire, March.

Hymenolepis coronula (Dujardin, 1845).

Golden-eye (*Glaucionetta clangula*), London, May.

Hymenolepis ? *crenata* (Goeze, 1782).

Great spotted woodpecker (*Dryobates major*), Surrey, May ; Berkshire, May ; Norfolk, November.

Hymenolepis creplini (Krabbe, 1869).

Pink-footed goose (*Anser brachyrhynchus*), Lancashire, November.

Hymenolepis diorchis Furhmann, 1913.

Long-tailed duck (*Clangula hyemalis*), Essex, September.

Hymenolepis evaginata Barker & Andrews, 1915.

*Musk-rat (*Ondatra zibethica*), Shropshire and Perthshire.

Hymenolepis farciminosa (Goeze, 1782).

Starling (*Sturnus vulgaris*), Westmorland ; Jay (*Garrulus glandarius*), Essex, March ; Hampshire, October and November ; Worcestershire, October and November ; Herefordshire, November ; Somerset, November ; Radnorshire, December.

Hymenolepis fringillarum (Rudolphi, 1810).

Starling (*Sturnus vulgaris*), London, June.

Hymenolepis furcifera (Krabbe, 1869).

Great crested grebe (*Podiceps cristatus*), Berkshire.

Hymenolepis ? *jägerskiöldi* Fuhrmann, 1913.

Common scoter (*Melanitta nigra*), Lincolnshire, February ; Kent, October.

Hymenolepis magnisaccis Meggitt, 1927.

Ringed plover (*Charadrius hiaticula*), Dorset, January ; Orkneys, February ; Purple sandpiper (*Erolia maritima*), Dorset, January.

Hymenolepis microstoma (Dujardin, 1845).

Wood-mouse (*Apodemus sylvaticus*), Surrey, April.

Hymenolepis multistriata (Rudolphi, 1810).

Little grebe (*Podiceps ruficollis*), February.

Hymenolepis muris-sylvatici (Rudolphi, 1819) of Baer, 1931.

Wood-mouse (*Apodemus sylvaticus*), near Oxford.

Hymenolepis nana (v. Siebold, 1852).

"Rat," Westmorland, August.

Hymenolepis neoarctica Davies, 1938. [*H. fusus* (Krabbe, 1869) of Linton, 1927.]

Herring-gull (*Larus argentatus*), Kent, September.

Hymenolepis phasianina Fuhrmann, 1907.

Pheasant (*Phasianus colchicus*), Cheshire, July.

Hymenolepis rectacantha Fuhrmann, 1906.

Oyster-catcher (*Hæmatopus ostralegus*), Norfolk, December.

Hymenolepis serpentulus (Schränk, 1788).

Song-thrush (*Turdus ericetorum*), Gloucestershire, February ; Cambridgeshire, May ; West of England, July ; Blackbird (*Turdus merula*), Isle of Wight, March ; Ring-ouzel (*Turdus torquatus*), Kent, October ; Carrion-crow (*Corvus corone*), Surrey, March.

Hymenolepis singularis Cholodkovsky, 1912.

"Shrew," Westmorland and Yorkshire.

Hymenolepis steudeneri Janicki, 1904.

Hedgehog (*Erinaceus europæus*), Westmorland, August.

Hymenolepis ? *stylosa* (Rudolphi, 1810).

Jay (*Garrulus glandarius*), Surrey, May ; Hampshire, October.

Hymenolepis villosa (Bloch, 1782).

Eastern little bustard (*Otis tetrax orientalis*), Hampshire, December.

Idiogenes ? *grandiporus* Cholodkovsky, 1905.

Eastern little bustard (*Otis tetrax orientalis*), Hampshire, December.

Ligula intestinalis (Linnæus, 1758).

Adult : Razorbill (*Alca torda*), Middlesex, October ; Goosander (*Mergus merganser*), Berkshire ; Shag (*Phalacrocorax aristotelis*), London, February ; Oxfordshire, March.

Larva : Roach (*Rutilus rutilus*), Norfolk, January ; London, October ; Gudgeon (*Gobio gobio*), July ; Brown trout (*Salmo trutta*), Shetlands, August.

Mesocetoides lineatus (Goeze, 1782).

Adult : Fox (*Vulpes vulpes*), Perthshire, February.

Larva (?) : Rabbit (*Oryctolagus cuniculus*), Yorkshire, January.

Monopylidium soricinum Cholodkovsky, 1906 [= *Amœbotœnia subterranea* Cholodkovsky, 1906].

Common shrew (*Sorex araneus*), Westmorland, June ; "Shrew," Yorkshire.

Monorygma ? chlamydoselachi (Lönnberg, 1898).

Friiled shark (*Chlamydoselachus anguineus*), west coast of Ireland, January.

Monorygma ? delphini (Gervais, 1870).

Larva: Common dolphin (*Delphinus delphis*), Yorkshire, February; east coast of Scotland.

Ophryocotyle insignis Lönnberg, 1890.

Bar-tailed godwit (*Limosa lapponica*), Norfolk, December.

Ophryocotyle proteus St. Friis, 1870.

Bar-tailed godwit (*Limosa lapponica*), January; Norfolk, December.

Orygmatobothrium musteli (v. Beneden, 1850).

Smooth hound (*Mustelus mustelus*), S. Devon, September.

Paranoplocephala blanchardi (Moniez, 1891) (?).

Water-vole (*Arvicola amphibius*), Perthshire, December.

Paranoplocephala omphalodes (Hermann, 1873).

Short-tailed vole (*Microtus hirtus*), near Oxford; Bank-vole (*Clethrionomys [Evotomys] glareolus*), near Oxford.

Paruterina vesiculigera (Krabbe, 1882).

Swift (*Microtus apus*), Warwickshire, July.

Phyllobothrium ? delphini (Bosc, 1802).

Larva: Pilot whale (*Globicephala melæna*), Cornwall, January.

Phyllobothrium lactuca v. Beneden, 1850.

Six-gilled shark (*Hexanchus griseus*), S. Devon, March.

Phyllobothrium thridax v. Beneden, 1850.

Thornback ray (*Raja clavata*), S. Devon, May; Blonde (*Raja brachyura*), S. Devon, May.

Phyllobothrium ? unilaterale Southwell, 1925.

Angel-fish (*Squatina squatina*), S. Devon.

Progygnotsenia odhneri Nybelin, 1914.

Ringed plover (*Charadrius hiaticula*), Dorset, January.

Raillietina (Skrjabinia) bonini (Mégnin, 1899).

Wood-pigeon (*Columba palumbus*), Aberdeenshire.

Raillietina (Paroniella) urogalli (Modeer, 1790).

Red grouse (*Lagopus scoticus*), Aberdeenshire, June; Ross-shire, October; Yorkshire; Ireland.

Schistocephalus solidus (Müller, 1776) [*gasterostei* Fabr., 1780].

Adult : Bittern (*Botaurus stellaris*) ; Red-necked grebe (*Podiceps griseigena*), Norfolk, February ; Shag (*Phalacrocorax aristotelis*), London, February.

Larva : Three-spined stickleback (*Gasterosteus aculeatus*), Durham, June ; Staffordshire, July ; Surrey, August.

Tænia hydatigena Pallas, 1766.

Larva : *Grey squirrel (*Sciurus carolinensis*), Oxfordshire.

Tænia pisiformis (Bloch, 1780).

Larva : Rabbit (*Oryctolagus cuniculus*), Durham, February ; Worcestershire, December ; Gloucestershire (?).

Tænia serialis Gervais, 1847.

Adult : Fox (*Vulpes vulpes*), Perthshire, February.

Larva : Rabbit (*Oryctolagus cuniculus*), Devon, Bedfordshire and (?) Westmorland.

Tænia tæniæformis (Batsch, 1786).

Adult : Wild cat (*Felis silvestris*), Perthshire, January.

Larva : House-mouse (*Mus musculus*), Westmorland, July ; Brown rat (*Rattus norvegicus*), Shropshire, March and December ; "Shrew," Cambridgeshire, June ; *Musk-rat (*Ondatra zibethica*), Sussex, Shropshire and Perthshire.

Tænia tenuicollis (Rudolphi, 1819).

Larva : Water-vole (*Arvicola Samphibius*), Shropshire, August ; *Grey squirrel (*Sciurus carolinensis*), Oxfordshire, November ; *Musk-rat (*Ondatra zibethica*), Shropshire and Perthshire.

Tatria biremis Kowalevsky, 1904.

Red-necked grebe (*Podiceps griseigena*), Norfolk, February.

Tatria decacantha Fuhrmann, 1913.

Little grebe (*Podiceps ruficollis*), Norfolk, December.

Tetrabothrius ? *cylindræus* (Rudolphi, 1819).

Manx shearwater (*Puffinus puffinus*), Pembrokeshire, March ; Herring-gull (*Larus argentatus*), Kent, September.

Tetrabothrius erostris (Lönnerberg, 1889).

Glaucous gull (*Larus hyperboreus*), Norfolk, November.

Tetrabothrius macrocephalus (Rudolphi, 1810).

Red-throated diver (*Colymbus stellatus*), Oxfordshire, February ; Hampshire, April ; Black-throated diver (*Colymbus arcticus*), Norfolk, January ; Great crested grebe (*Podiceps cristatus*), Gloucestershire, April.

Trizenophorus nodulosus (Pallas, 1781).

Pike (*Esox lucius*), Wiltshire, February ; Berkshire, October ; Cambridgeshire, December.

Trigonocotyle monticellii (Linton, 1923).

Pilot whale (*Globicephala melæna*), Cornwall, January.

NEMATODES.

Acuaria (*Echinuria*) *decorata* Cram, 1927.

Little grebe (*Podiceps ruficollis*), Norfolk, December ; Great crested grebe (*Podiceps cristatus*), Gloucestershire, April.

Acuaria (*Echinuria*) *horrida* (Rudolphi, 1809).

Ringed plover (*Charadrius hiaticula*), Dorset, January ; Purple sandpiper (*Erolia maritima*), Dorset, January ; Dunlin (*Erolia alpina*), S. Scotland, January.

Acuaria (*Synhimantus*) *laticeps* (Rudolphi, 1819).

Peregrine falcon (*Falco peregrinus*), Cornwall, April ; Short-eared owl (*Asio flammeus*), Norfolk, November.

Acuaria (*Cosmocephalus*) *obvelata* (Creplin, 1825).

Black-headed gull (*Larus ridibundus*), London, February ; Arctic skua (*Stercorarius parasiticus*), Norfolk, September ; Spotted redshank (*Tringa erythropus*), Forfarshire, September.

Amidostomum ? *monodon* (v. Linstow, 1882).

Common scoter (*Melanitta nigra*), Lincolnshire, February.

Amidostomum nodulosum (Rudolphi, 1803).

Pink-footed goose (*Anser brachyrhynchus*), Norfolk, December ; Gloucestershire, February and March.

Amidostomum ? *raillieti* Skrjabin, 1915.

Coot (*Fulica atra*), Kent, February.

Amidostomum skrjabini Boulenger, 1926.

Scaup-duck (*Nyroca marila*), Hebrides and Kirkcudbrightshire ; Gadwall (*Anas strepera*), Hebrides ; Golden-eye (*Glaucionetta clangula*), Hampshire, January ; London, May.

Amidostomum spatulatum Baylis, 1932.

Bean-geese (*Anser fabalis*), Norfolk, January ; Kirkcudbrightshire, March ; White-fronted goose (*Anser albifrons*), Kirkcudbrightshire, March ; Pink-footed goose (*Anser brachyrhynchus*), Gloucestershire, March.

Anacanthocheilus rotundatus (Rudolphi, 1819).

"Skate," Durham.

Anisakis kükenenthalii (Cobb, 1888).

White whale (*Delphinapterus leucas*), Clackmannanshire, December.

Anisakis similis (Baird, 1853).

Grey seal (*Halichærus grypus*), Cornwall, November.

Anisakis ? simplex (Rudolphi, 1809).

False killer (*Pseudorca crassidens*), Lincolnshire, November.

Aplectana acuminata (Schränk, 1788).

Common toad (*Bufo bufo*), Westmorland, September.

Ascaridia galli (Schränk, 1788).

Pheasant (*Phasianus colchicus*), Hampshire.

Ascarophis morrhuae v. Beneden, 1871.

Streaked gurnard (*Trigla lineata*), S. Devon, May ; Pogge (*Agonus cataphractus*), S. Devon.

Camallanus lacustris (Zoega, in Müller, 1776).

Perch (*Perca fluviatilis*), Wiltshire and Berkshire, September ; Middlesex, June and July ; Pope (*Acerina cernua*), Buckinghamshire, August.

Capillaria ? erinacei (Rudolphi, 1819).

Hedgehog (*Erinaceus europæus*), Shropshire, March ; Westmorland, August.

Capillaria exigua (Dujardin, 1845).

Hedgehog (*Erinaceus europæus*), Westmorland, August.

Capillaria ? exilis (Dujardin, 1845).

Song-thrush (*Turdus ericetorum*), Cambridgeshire, June ; Missel-thrush (*Turdus viscivorus*) [Lincolnshire ?], December ; Starling (*Sturnus vulgaris*), Kent, May and November ; Pheasant (*Phasianus colchicus*), Glamorganshire.

Capillaria felis-cati (Diesing, 1851).

Wild cat (*Felis silvestris*), Perthshire, January.

Capillaria hepatica (Bancroft, 1893).

Wood-mouse (*Apodemus sylvaticus*), Buckinghamshire, January to March ; Rabbit (*Oryctolagus cuniculus*), Gloucestershire, January and March ; *Musk-rat (*Ondatra zibethica*), Shropshire.

Capillaria longicollis (Rudolphi, 1819).

Pheasant (*Phasianus colchicus*), Cheshire, July ; Westmorland, August ; Partridge (*Perdix perdix*), Forfarshire, November ; Eastern little bustard (*Otis tetrax orientalis*), Hampshire, December.

Capillaria ? muris-sylvatici (Diesing, 1851).

Wood-mouse (*Apodemus sylvaticus*), Westmorland, August.

Capillaria ovopunctata (v. Linstow, 1873).

Starling (*Sturnus vulgaris*), Kent, May ; London, June ; Blackbird (*Turdus merula*), Middlesex, May ; Hertfordshire, October.

Capillaria resecta (Dujardin, 1843).

Carion crow (*Corvus corone*), Surrey, March ; Jay (*Garrulus glandarius*), Kent, January ; Hampshire, October, November and December ; Worcestershire, October and November ; Wiltshire, October and November ; Herefordshire, November ; Radnorshire, November ; Surrey, December.

Capillaria tenuissima (Rudolphi, 1803).

Little owl (*Carine noctua*), July ; Kent, December ; Tawny owl (*Strix aluco*), Aberdeenshire, February ; Wiltshire, April ; Short-eared owl (*Asio flammeus*), Kent, February ; Norfolk, November.

Capillaria ? triloba (v. Linstow, 1875).

Lapwing (*Vanellus vanellus*), Kent, April.

Chevreuzia revoluta (Rudolphi, 1819).

Ringed plover (*Charadrius hiaticula*), Kent, March.

Contracæcum auctum (Rudolphi, 1802).

Dragonet (*Callionymus lyra*), S. Devon.

Contracæcum clavatum (Rudolphi, 1809).

Twaite shad (*Alosa finta*), Sussex, June ; Conger (*Conger conger*), S. Devon, May ; Cod (*Gadus callarias* [*G. morrhua*]), Yorkshire, April ; Coal-fish (*Gadus virens*), Yorkshire and Norfolk ; Whiting (*Gadus merlangus*), S. Devon, March and May ; Hake (*Merluccius merluccius*), S. Devon, May ; Boarfish (*Capros aper*), S. Devon, May ; Red Mullet (*Mullus surmuletus*), S. Devon, May ; John Dory (*Zeus faber*), S. Devon, May ; Ray's bream (*Brama rai*), Yorkshire ; Piper (*Trigla lyra*), S. Devon, March ; Sea-scorpion (*Cottus bubalis*), S. Devon, May ; Angler (*Lophius piscatorius*), S. Devon, March, May and July.

Contracæcum ? micropapillatum (Stossich, 1890).

Pomatorhine skua (*Stercorarius pomarinus*), Wiltshire, December.

Contracæcum osculatum (Rudolphi, 1802).

Grey seal (*Halichærus grypus*), Cornwall, November ; Carmarthenshire, January.

Contracæcum ? *ovale* (v. Linstow, 1907).

Great crested grebe (*Podiceps cristatus*), Berkshire.

Contracæcum rigidum (Rudolphi, 1809).

Angler (*Lophius piscatorius*), S. Devon, March and May.

Contracæcum spiculigerum (Rudolphi, 1809).

Cormorant (*Phalacrocorax carbo*), Scilly Is., December ; Shetlands, January ; Shag (*Phalacrocorax aristotelis*), Dorset, September ; Red-breasted merganser (*Mergus serrator*), Outer Hebrides, February and April ; Arctic skua (*Stercorarius parasiticus*), East Lothian, September ; Norfolk, September.

Crenosoma striatum (Zeder, 1800).

Hedgehog (*Erinaceus europæus*), Shropshire, March.

Cucullanus heterochrous Rudolphi, 1802.

Plaice (*Pleuronectes platessa*), S. Devon, May ; Sole (*Solea solea*), S. Devon, May.

Cucullanus hians (Dujardin, 1845).

Conger (*Conger conger*), S. Devon, May ; Angler (*Lophius piscatorius*), S. Devon, May.

Cucullanus tripapillatus (Gendre, 1926).

Sole (*Solea solea*), S. Devon, March.

Cucullanus truttæ Fabricius, 1794.

Brown trout (*Salmo trutta*), Hampshire, February and December.

Cystidicola farionis Fischer v. Waldheim, 1798.

Brown trout (*Salmo trutta*), Hampshire, February, August and September.

Enterobius sciuri Cameron, 1932.

Red squirrel (*Sciurus vulgaris*), Northumberland, August.

Epomidiostomum orispinum (Molin, 1861).

Bean-geese (*Anser fabalis*), Kirkcudbrightshire, March ; White-fronted goose (*Anser albifrons*), Kirkcudbrightshire, March.

Epomidiostomum uncinatum (Lundahl, 1848).

Wigeon (*Mareca penelope*), Lincolnshire, February.

Graphidium strigosum (Dujardin, 1845).

Rabbit (*Oryctolagus cuniculus*), Gloucestershire (?) ; Common hare (*Lepus europæus*), Berkshire, December.

Heligmosomum glareoli (Baylis, 1928).

Bank-vole (*Clethrionomys [Eutamias] glareolus*), near Oxford.

Heterakis gallinæ (Gmelin, 1790).

Hybrid Blackcock-pheasant (*Lyrurus tetrix* × *Phasianus colchicus*), Lancashire, February ; [*H. gallinæ*] Tawny owl (*Strix aluco*), Wiltshire, April.

Metabronema truttæ Baylis, 1935.

Brown trout (*Salmo trutta*), Monmouthshire, April.

Morganiella talpæ (Morgan, 1928).

Mole (*Talpa europæa*), Surrey, June.

Nematospiroides dubius Baylis, 1926.

Wood-mouse (*Apodemus sylvaticus*), London, March ; Surrey, April and June ; Westmorland, August.

Oswaldocruzia filiiformis (Goeze, 1782).

"Newt," Westmorland, September.

"*Oxyuris*" *acutissima* (Zeder, 1800) (?).

Red squirrel (*Sciurus vulgaris*), Dumfriesshire, March.

Paraquimperia tenerrima (v. Linstow, 1878).

Eel (*Anguilla anguilla*), Hampshire, July.

Parastrongyloides winchesi Morgan, 1928.

Mole (*Talpa europæa*), Surrey, June.

Passalurus ambiguus (Rudolphi, 1819).

Rabbit (*Oryctolagus cuniculus*), Westmorland, August ; Hertfordshire, October.

Porrocæcum angusticolle (Molin, 1860).

Sparrow-hawk (*Accipiter nisus*), Sussex, August ; Merlin (*Falco columbarius*), Kent, November.

Porrocæcum ensicaudatum (Zeder, 1800).

Blackbird (*Turdus merula*), Cambridgeshire, February ; Hertfordshire, October ; Song-thrush (*Turdus ericetorum*), Cambridgeshire, May ; Redwing (*Turdus musicus*), Isle of Wight, March ; Starling (*Sturnus vulgaris*), Westmorland, May ; London, June ; Rook (*Corvus frugilegus*), Westmorland, May ; Carrion-crow (*Corvus corone*), Gloucestershire, June.

Porrocæcum semiteres (Zeder, 1800).

Lapwing (*Vanellus vanellus*), Kent, April.

Porrocæcum spirale (Rudolphi, 1797).

Little owl (*Carine noctua*), July ; Barn-owl (*Tyto alba*), Lincolnshire, February ; Tawny owl (*Strix aluco*), Wiltshire, April.

Proleptus obtusus (Dujardin, 1845).

Rough hound (*Scyliorhinus caniculus*), S. Devon, May ;
Nurse hound (*Scyliorhinus stellaris*), S. Devon, May.

Proleptus robustus (v. Beneden, 1871).

Thornback ray (*Raja clavata*), S. Devon, May ; Smooth
hound (*Mustelus mustelus*), S. Devon.

Pseudalius inflexus (Rudolphi, 1809).

Porpoise (*Phocæna phocæna*), Cornwall (?), December.

Raphidascaris cristata (v. Linstow, 1872).

Pike (*Esox lucius*), Wiltshire, February ; Surrey, April.

Serratospiculum tendo (Nitzsch, in Giebel, 1857).

Peregrine falcon (*Falco peregrinus*), Cornwall, April ; Nor-
folk, December.

Soboliphyme soricis Baylis & King, 1932.

Common shrew (*Sorex araneus*), Great Cumbrae, Firth of
Clyde, August.

Squamofilaria coronata (Rudolphi, 1809).

Roller (*Coracias garrulus*), Northumberland.

Stenurus minor (Kuhn, 1829).

Porpoise (*Phocæna phocæna*), Carmarthenshire, January.

Stenurus ovatus (v. Linstow, 1910).

Bottle-nosed dolphin (*Tursiops truncatus*), Cornwall, June ;
Sussex, September.

Streptocara ? recta (v. Linstow, 1879).

Little grebe (*Podiceps ruficollis*), Norfolk, December.

Streptocara ? stellæ-polaris (Parona, 1901).

Storm-petrel (*Thalassidroma pelagica*), Ireland, November ;
Manx shearwater (*Puffinus puffinus*), Pembrokeshire, June.

Streptocara ? tridentata (v. Linstow, 1877).

Red-throated diver (*Colymbus stellatus*), Oxfordshire, Feb-
ruary.

Strongyloides ? papillosus (Wedl, 1856).

Weasel (*Mustela nivalis*), Kent, June.

Syngamus merulæ Baylis, 1926.

Blackbird (*Turdus merula*), Hampshire and Essex, January
to March ; Song-thrush (*Turdus ericetorum*), Essex ; Redwing
(*Turdus musicus*), Essex.

Syngamus trachea (Montagu, 1811).

Pheasant (*Phasianus colchicus*), Sussex, June ; Hampshire ; Rook (*Corvus frugilegus*), Westmorland ; Hampshire, February ; Carrion-crow (*Corvus corone*), Surrey, April and June ; Shropshire, May ; Gloucestershire, June ; Essex ; Jackdaw (*Corvus monedula*), Hampshire, February ; Jay (*Garrulus glandarius*), Hampshire, October ; Magpie (*Pica pica*), Shropshire, May ; Hampshire ; Starling (*Sturnus vulgaris*), Hampshire, February ; House-sparrow (*Passer domesticus*), Essex ; Kestrel (*Falco tinnunculus*), Fifeshire ; Purple sandpiper (*Erolia maritima*), Outer Hebrides.

Symphacia obvelata (Rudolphi, 1802).

Wood-mouse (*Apodemus sylvaticus*), Cambridgeshire, November ; Hebridean field-mouse (*Apodemus hebridensis*), Outer Hebrides ; "Wood and field mice," Westmorland, August ; Water vole (*Arvicola amphibius*), Shropshire and Perthshire.

Symphacia stroma (v. Linstow, 1884).

Wood-mouse (*Apodemus sylvaticus*), Surrey, June.

Toxocara canis (Werner, 1782).

Fox (*Vulpes vulpes*), Berkshire, December.

Toxocara mystax (Zeder, 1800).

Wild cat (*Felis silvestris*), Perthshire, January.

Trichostrongylus colubriformis (Giles, 1892).

*Grey squirrel (*Sciurus carolinensis*), Oxfordshire, March and November.

Trichostrongylus retortæformis (Zeder, 1800).

Rabbit (*Oryctolagus cuniculus*), Yorkshire, January ; Common hare (*Lepus europæus*), Aberdeenshire, February.

Trichostrongylus tenuis (Mehlis, in Creplin, 1846).

Pink-footed goose (*Anser brachyrhynchus*), Norfolk, December ; Gloucestershire, February ; White-fronted goose (*Anser albifrons*), Kirkcudbrightshire, March.

Trichuris muris (Schränk, 1788).

House-mouse (*Mus musculus*), Isle of May, Fifeshire, July.

Uncinaria stenocephala (Railliet, 1884).

Fox (*Vulpes vulpes*), Perthshire, February.

ACANTHOCEPHALA.

Acanthocephaloides propinquus (Dujardin, 1845).

Dragonet (*Callionymus lyra*), S. Devon, May.

Acanthocephalus lucii (Müller, 1779).

Perch (*Perca fluviatilis*), Middlesex, July; Hertfordshire, September; Berkshire, September; Wiltshire, January and September; Pope (*Acerina cernua*), Buckinghamshire, August; Dace (*Leuciscus leuciscus*), Cambridgeshire.

Acanthocephalus ranæ (Schrank, 1788).

Common toad (*Bufo bufo*), Westmorland, August; "Newt," Westmorland, September.

Arhythmorhynchus longicollis (Villot, 1875).

Purple sandpiper (*Erolia maritima*), Dorset, January.

Bolbosoma capitatum (v. Linstow, 1880).

False killer (*Pseudorca crassidens*), Ross-shire, December; Lincolnshire, November; Pilot whale (*Globicephala melæna*), Cornwall, January.

Centrorhynchus aluconis (Müller, 1780).

Tawny owl (*Strix aluco*), Wiltshire, April; Little owl (*Carine noctua*), Cambridgeshire; Common buzzard (*Buteo buteo*), Devon, December.

Corynosoma strumosum (Rudolphi, 1802).

Grey seal (*Halichoerus grypus*), Carmarthenshire, January; Great northern diver (*Colymbus immer*), Outer Hebrides, March.

Corynosoma tunitæ Weiss, 1914.

Cormorant (*Phalacrocorax carbo*), Scilly Isles, December; Shetlands, January; Shag (*Phalacrocorax aristotelis*), Dorset, September.

Echinorhynchus gadi Zoega, in Müller, 1776.

Coal-fish (*Gadus virens*), Yorkshire; north of England, August; Fifteen-spined stickleback (*Spinachia spinachia*), S. Devon, May.

Echinorhynchus ? leidy van Cleave, 1924.

Five-bearded rockling (*Onos mustelus*), S. Devon, May.

Echinorhynchus truttæ Schrank, 1788.

Brown trout (*Salmo trutta*), Hampshire, November and December; Shropshire; Monmouthshire; Grayling (*Thymallus thymallus*), Herefordshire; Eel (*Anguilla anguilla*), Hampshire, July; Shropshire; Roach (*Rutilus rutilus*), Cambridgeshire; Dace (*Leuciscus leuciscus*), Cambridgeshire.

Plagiorhynchus crassicollis (Villot, 1875).

Ringed plover (*Charadrius hiaticula*), Dorset, January.

Polymorphus boschadis (Schränk, 1788).

Garganey (*Querquedula querquedula*), Shropshire, January.

Pomphorhynchus lævis (Zoega, in Müller, 1776).

Eel (*Anguilla anguilla*), Berkshire, June; Chub (*Squalius cephalus*), Berkshire, June; Perch (*Perca fluviatilis*), Berkshire, September.

Pomphorhynchus ? tereticollis (Rudolphi, 1809).

Cod (*Gadus callarias*), S. Devon; Pout (*Gadus luscus*), S. Devon.

Prosthorrhynchus transversus (Rudolphi, 1819).

Song-thrush (*Turdus ericetorum*), Cambridgeshire, February and June; Blackbird (*Turdus merula*), Cambridgeshire, February and May; Hertfordshire, October; Middlesex, May; Great spotted woodpecker (*Dryobates major*), Norfolk, November.

Corrigenda to 1928 List.

P. 331, line 2, delete Moorhen (*Gallinula chloropus*), Argyllshire.

line 12, for *Distoma migrans* Duj., 1845, read *Brachylæmus dujardini* (Baer, 1928); and to the hosts for this species add: Pigmy shrew (*Sorex minutus*), near Oxford.

line 20, for *Echinostoma pungens* v. Linstow, 1894, read ? "*Peta-siger*" *neocomense* Fuhrmann, 1927.

P. 334, line 31, for *Nyloca* read *Nyroca*.

P. 339, line 3, for *cirratus* Müller, 1780, read *heterochrous* Rudolphi, 1802.

P. 341, line 6, delete Smooth hound (*Mustelus lævis*), S. Devon.

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 BAYLIS, H. A., & JONES, E. I. 1933. "Some Records of Parasitic Worms from Marine Fishes at Plymouth." *Journ. Marine Biol. Assoc. U.K.* xviii. pp. 627-634.

XXXIX.—*A new Species of Sergestes (Crustacea, Decapoda) from the South Atlantic.* By ISABELLA GORDON, D.Sc., Ph.D., Department of Zoology, British Museum (Nat. Hist.).

IN 1926 the 'Discovery' obtained, in mid South Atlantic, two remarkably fine specimens of a new species of *Sergestes*. They were examined by Dr. S. W. Kemp, F.R.S., who made a detailed note of the colour in life and of the distribution of the pigment spots. Unfortunately, owing to pressure of other work, Dr. Kemp

has not been able to re-examine this *Sergestes*, and has sent the specimens to me for description. I have to thank Dr. Kemp for entrusting me with the material, and for permission to reproduce his note. The specimens will be deposited in the collection of the British Museum (Nat. Hist.).

Sergestes regalis, sp. n.

Material.—‘Discovery’ Stn. 81, 32° 45’ S., 8° 47’ W. 18. vi. 26, 650–0 m. N. 450 H. Two male specimens, holotype and paratype, each measuring 83 mm. in length.

Description of the Holotype.—The *carapace*, which is approximately half the length of the abdomen (telson excluded), is represented in fig. 1 *a*. The rostrum is rather peculiar in having a bifid apex (figs. 1 *b*, *a'*). The posterior cervical sulcus is well defined, especially across the dorsal surface of the carapace; the anterior cervical sulcus is indicated laterally, but fades out dorsally (fig. 1 *a*). On the posterior proximal portion of the branchiostegite are two rather deep sulci separated by a ridge. The other sulci are indicated by dotted lines in the figure.

The *branchiæ*, which are visible through the branchiostegite, are indicated by broken lines in the figure. In the holotype they measure 3, 5, 6.4, 7, 7.3, 5.1, 6.7, and 5.6 mm. respectively*.

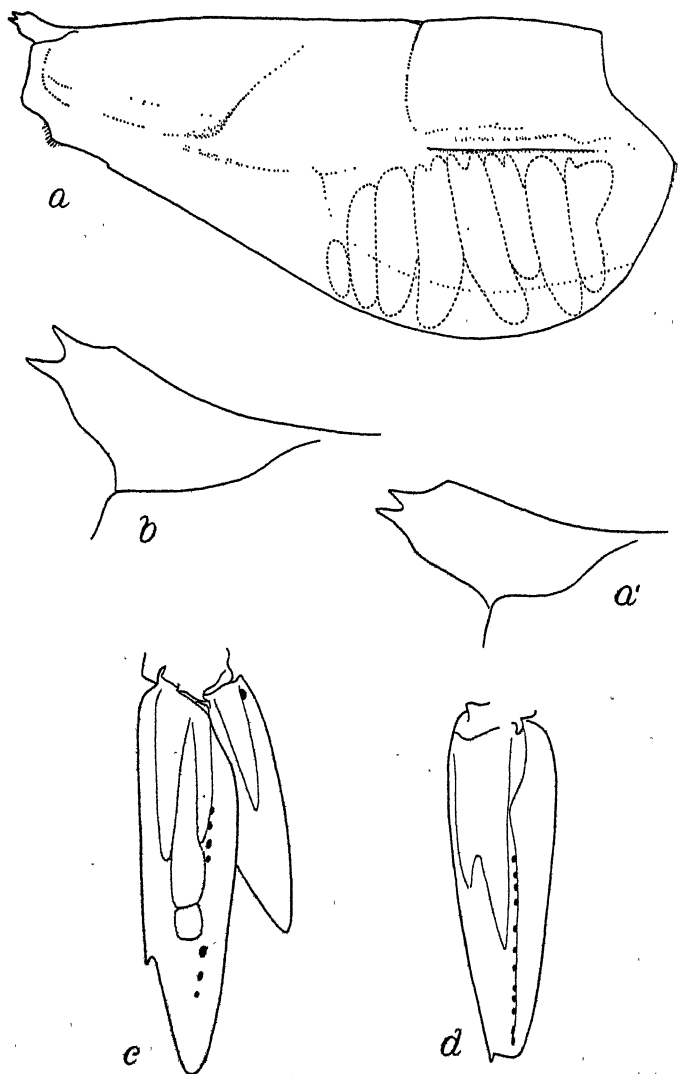
The sixth *abdominal* somite, which is rather longer than the telson, ends posteriorly in a spinule. In the mid-dorsal line there is a rather wide shallow groove on each of the first four abdominal somites; those on the third and fourth are rather longer and more distinct than those on the two anterior somites. As a continuation of this series, there is a faint oval depression on the carapace behind the posterior cervical sulcus.

The *telson* gradually tapers to a point, a median groove runs along almost its entire length and is bounded by two low ridges. The distal fourth of each ridge is armed with three spinules and the lateral margins are setose.

The *uropod* is represented in fig. 1 *c*, but the setæ, which are present on the outer and inner margin of the inner uropod, and on the inner and distal third of the outer margin of the outer uropod, have been omitted.

* In the paratype the gills, excluding the small anterior one, measure 4.85, 6, 6.25, 6.75, 4.75, 6, 5 mm. respectively.

Fig. 1.

*Sergestes regalis*, sp. n.

- a.* Carapace of paratype, $\times 3.5$. *a'.* Rostrum of same, more highly magnified. *b.* Rostrum of holotype. *c.* Uropod of holotype. *d.* Antennal scale of holotype.

The eye is approximately two-thirds the length of the basal segment of the antennular peduncle. The cornea is much wider, and also longer (4:3), than the distal segment of the ocular peduncle. There is no ocular tubercle.

Antennule.—The peduncle is robust and tapers gradually; the basal segment is rather shorter than the sum of the second and third (3:2:1.6), is twice as long as wide, and has a notch and spinule at the middle of the outer margin. The third segment is unarmed at the distal end, and the ventral margin, which is fringed with setæ, is somewhat concave distally.

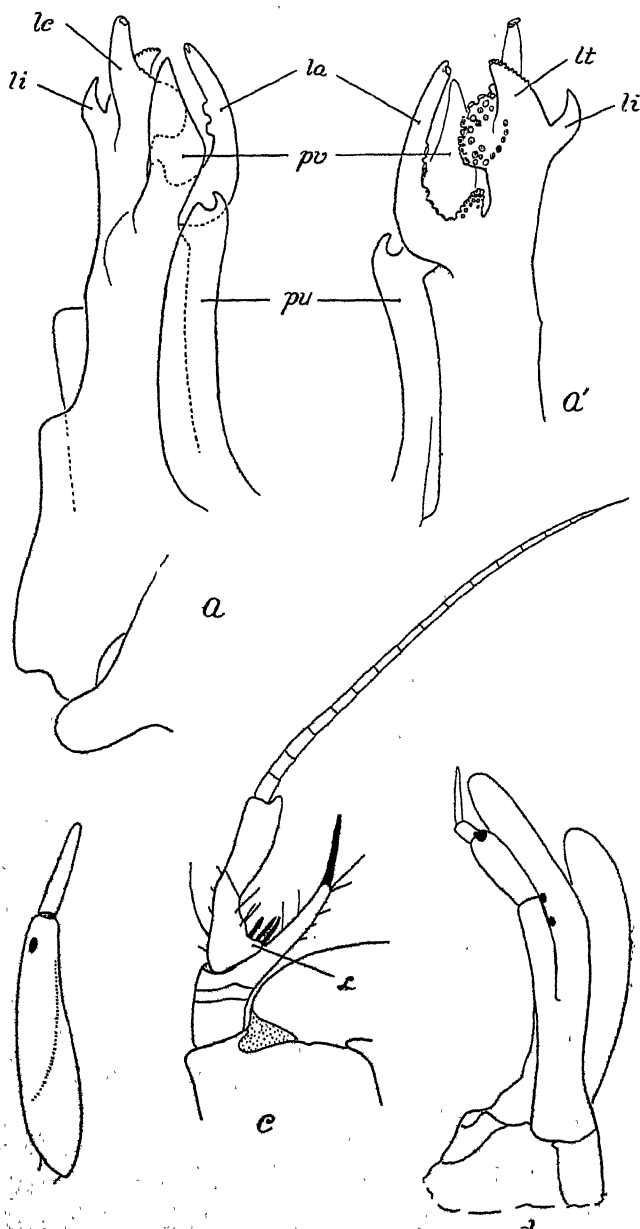
The lower flagellum, represented in fig. 2c, is half as long again as the third segment of the antennular peduncle. It also is divided into a peduncle and a flagellum. The first segment of the peduncle is slightly longer than the sum of the second and third, and the fourth is twice the sum of segments 1-3. The upper border of the fourth segment is concave proximally and is armed with three or four stout blunt spines at α ; there appears to be an oblique, median suture. The upper prolongation of the third segment is very long (reaching to the distal end of the fourth segment), and the distal portion takes the form of a strong brownish spine. The flagellum is composed of 14 or 15 segments.

The *scaphocerite* or antennal scale, represented in fig. 1d, does not extend quite to the middle of the third segment of the antennular peduncle.

Mouth-parts.—The mandible, the masticatory edge of which is represented in fig. 3b, possesses the usual two-jointed palp (fig. 2b). The palp of the maxillula terminates in a long, curved brownish spine (fig. 3c, the setæ have been omitted with the exception of the brownish spinose ones). The distal endite of the maxilla is distinctly divided; the distal lobe of the proximal endite is large and setose, the small non-setose lobule at the base may represent the proximal lobe of the endite; the endopodite ("palpus" of Balss*) is armed with spines at and near the apex, as represented in the enlarged figure (fig. 3a).

* Kükenthal and Krumbach, 'Handbuch der Zoologie,' vol. iii. pt. 1, p. 860 (1927).

Fig. 2.



The first maxilliped is represented in fig. 4 *a*, the majority of the setæ being omitted. The endopodite ("taster" of Balss) is partially concealed by the exopodite; the epipodite, which was detached from the appendage from which the drawing was made, is represented by a broken line. The distal endite ("basis" of Balss) is of great length, and the proximal one ("coxa" of Balss) is subdivided; all are heavily setose. In fig. 2 *d* the maxilliped is represented from the outer side in order to show the position of the three pigment spots. The second maxilliped is very robust and reaches to about the middle of the second segment of the antennular peduncle; the merus is approximately twice as long as wide and subequal to the ischium; the dactylus is one-third of the propodus (fig. 4 *d*). The third maxilliped, though long and slender, is rather shorter than either peræopod II or III, and extends to the distal end of the antennular peduncle; the dactylus has six, the propodus two subdivisions, as represented in fig. 3 *d*; the propodus is equal to the carpus and rather shorter than the merus; the ischium is somewhat more robust than that of the third peræopod.

Peræopods.—The first peræopod reaches to the middle of the propodus of the third maxilliped (when the two detached appendages are placed side by side); the dactylus is nearly twice the length of the propodus (1.8:1) and there is the usual comb-like arrangement of setæ in opposition on either side of the articulation. The third peræopod, which, like the second, is chelate, extends beyond the antennular peduncle by about half the length of the propodus; the merus is considerably longer, and the carpus shorter, than the propodus.

The fourth peræopod extends to the base of the antennal scale; the fifth, though of the same compressed laminar type as the fourth, is much shorter.

EXPLANATION OF FIG. 2.

Sergestes regalis, sp. n.

- a*. Petasma of holotype, posterior aspect. *a'*. Petasma of holotype, anterior aspect (*i. e.*, side that lies along the thoracic sternite).
b. Mandibular palp of paratype. *c*. Secondary or lower ramus of antennule of paratype. *d*. First maxilliped to show photophores.
la, lobus armatus; *lc*, lobus connectens; *li*, lobus inermis; *lt*, lobus terminalis; *pu*, processus uncifer of the pars externa; *pv*, processus ventralis.

The *petasma* is represented in fig. 2 *a* and *a'*. The lobus armatus, which reaches the apex of the lobus terminalis and slightly surpasses the processus ventralis,

Fig. 3.



Sergestes regalis, sp. n. Paratype.

- a.* Maxilla, with apex of endopodite (or palp) more highly magnified. *b.* Cutting edge of mandible. *c.* Maxillula. *d.* Propodus and dactylus of third maxilliped (photophore on distal end of carpus is situated on the other side, and has therefore been shaded in the figure).

N.B.—Most of the setæ have been omitted in *a* and *c*.

has at its base a high conical lobe armed with small hooks. The lobus connectens which, like the lobus armatus has a terminal (retracted) hook, is considerably longer than the lobus terminalis.

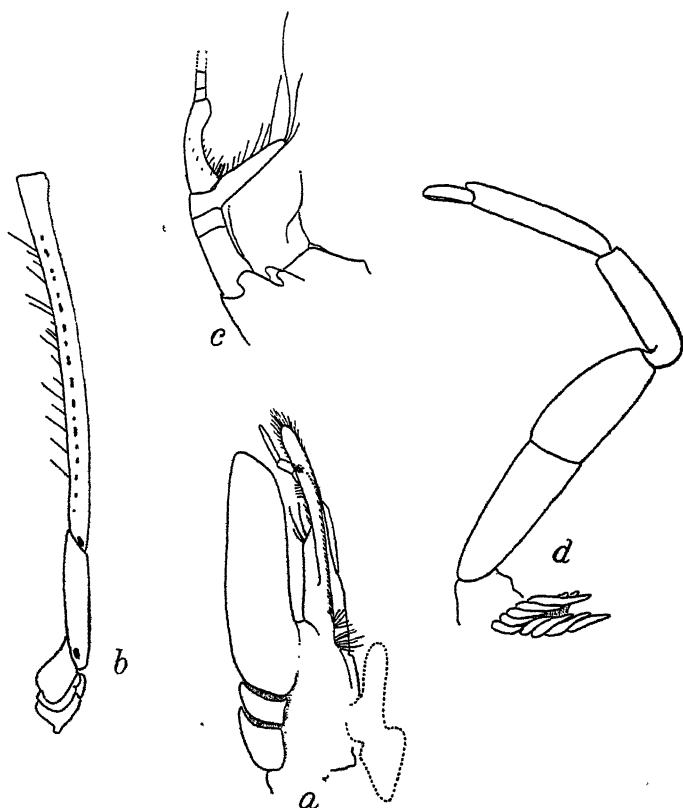
Colour in life and list of pigment spots.—The following note by Dr. Kemp is based on an examination of the specimens prior to fixation and preservation:—

“ Station 81. Note No. 49.

Sergestes sp. 2 large ♂.

Bright scarlet red, deepest on gastric region and palest

Fig. 4.



Sergestes regalis, sp. n. Paratype.—*a.* First maxilliped. *b.* Proximal segments of third pereopod. *d.* Second maxilliped.
Sergestes robustus Smith.—*c.* Secondary ramus of antennule of male.

N.B.—Most of the setæ have been omitted in *a* and *d*.

on tail-fan, with clearly circumscribed deep purple spots in the following positions :—

Carapace—a row of 7 or 8 in roof of branchial chamber.

A short curved line behind antennule with a spot below and behind it—both beneath carapace. 2 behind base of antennæ, beneath carapace. None along inferior margin.

Eyestalk—none. Antennular peduncle—none.

Antennal scale—1 at articulation and a longitudinal row of 9 to 11 in distal three-quarters. 1 placed inferiorly on fifth segment of antennal peduncle.

Mandible—1 at distal end of basal segment of palp.

First maxilla—none.

Second maxilla—3 on exopod.

First maxilliped—2 on exopod.

Second maxilliped—none.

Third maxilliped—2 on carpus, 1 on propodus.

First leg—1, placed proximally, on ischium, 5 on merus.

Second leg—1 do. on ischium, 1 in ischio-meral articulation.

Third leg—as second, and with 12 on merus.

Fourth leg—4 on ischium, 5 on merus.

Fifth leg—3 on ischium.

Thoracic sternum—

2 in midventral line between bases of antennæ.

1 pair between bases of second maxillipeds.

† 1 median „ „ third maxillipeds.

1 „ „ „ 1st-2nd legs.

1 „ „ „ 2nd-3rd legs.

1 median and 1 pair between bases of 3rd-4th legs.

1 „ „ „ 4th-5th legs.

2 on each side behind base of 5th leg.

Abdominal sternum :—

		In advance of pleopod.	Between pleopods.	Behind pleopods.
First sternite	paired	1	_____	2
	median.	1		
Second „	paired	1	_____	2
	median.	1		
Third „	paired	1	_____	2
	median.	1	_____ 1	
Fourth „	paired	1		
	median	1	_____ 1 _____	1
Fifth „	paired	1		
	median.	1	_____ 1 _____	1

Sixth sternite—1 at each antero-inferior angle and, in median line, a row of 4 or 5 in anterior half, 2 further back and 1 at extreme posterior end.

Pleopods—At distal end of protopodite, placed anteriorly, 1 on 2nd and 3rd pairs, 2 on 4th and 1 on 5th. 1 at about middle of endopod of 2nd, 3rd, and 4th pairs.

Uropods—1 at inner angle of inner uropod. On outer uropod a row of 4 near middle and another row of 2 or 3 at distal end, the foremost in line with tooth of outer margin.

These purple spots are probably luminous organs: portions of tissue containing them have been dissected out and fixed in Dubosq., together with a few of the appendages *."

In the preserved material it is often difficult or impossible to see the pigment spots, but those on the appendages which had been removed for detailed examination can be readily observed. They are yellowish or whitish in colour and exhibit a faint striation; if examined by transmitted light they are seen as dark patches in such parts as are semi-transparent (*e. g.*, peræopod iv., antennal scale, uropod).

There appears to be some slight variation in the number of the pigment spots, and Dr. Kemp's list agrees more closely with the holotype than with the paratype. For example :—(1) in the holotype there is a uniform series of twelve large pigment spots on the merus of peræopod iii., in the paratype there are eighteen spots which vary in size and shape as represented in fig. 4 *b*; (2) in the paratype there are at least nine pigment spots on the merus of peræopod iv.; (3) in the maxilla represented in fig. 3 *a*, also from the paratype, the three spots on the exopod appear to be wanting; (4) the first maxilla of the paratype has three photophores, two on the exopodite, one on the endopodite ("taster"), as represented in fig. 2 *d*.

On the thoracic sternum, I have not detected the two spots in the mid-ventral line between the bases of the antennæ, nor with absolute certainty the pair between the bases of the second maxillipeds. The next one († in list), however, appears to be rather in advance of the

* A detailed account of the histology of these organs will be given elsewhere by R. Dennell, Esq.

third maxillipeds (i. e., on the somite that bears the second maxillipeds).

Remarks.—This species appears to be most closely allied to *S. robustus* Smith, which differs from it in the following respects :—

(a) The rostrum in *S. robustus* is longer and more slender, with a single apical spinule (cf. Hansen, 1922, pl. vi. figs. 2 b, 2 c with fig. 1 a, a', b of this paper).

(b) The posterior cervical sulcus is absent (smaller specimen) or very faintly indicated dorsally (larger specimen) in the only specimens of *S. robustus* that I have examined*. The cervical sulci, especially the posterior one, are more pronounced in *S. regalis*.

(c) In *S. robustus* the branchiæ of the larger specimen measure (?), 5.15, 6.00, 7.20, 7.60, 6.50, 6.25, and 5.60 mm. respectively. The posterior arthrobranch of xii.—the third gill from the posterior end—is rather longer, not shorter, than the succeeding arthrobranch (cf. measurements for *S. regalis* on p. 499).

(d) The prehensile antennular flagellum of the male *S. robustus* differs markedly from that of *S. regalis* (cf. figs. 4 c and 2 c). The first three segments together equal the fourth, the upper border of which is concave in the proximal two-thirds; the "processus" of segment 3 bears long slender setæ instead of the usual strong spine †.

(e) *Petasma.*—In *S. robustus* the lobus armatus is rather shorter than the processus ventralis and appears to lack the basal conical projection; the lobus inermis is relatively smaller; the lobus connectens, which does not exceed the lobus terminalis in length, is more slender and somewhat S-shaped in the small male examined (cf. Hansen 1922, pl. vi. figs. 2 m, n, o with figs. 2 a, a' of this paper).

(f) In *S. robustus* the cornea, in dorsal aspect, is twice as long as the distal segment of the ocular peduncle.

(g) In life the colour differs markedly in the two species (cf. Kemp, 1910, p. 28, *colour in life*, with Kemp's note on p. 505).

S. robustus, as is well known, possesses photophores on the uropods and antennal scales (Sund, 1920, p. 6 in

* Two specimens determined by Kemp, 1910, p. 29, S.R. 299, 1 ♀ 87 mm. long, and S.R. 494, 1 ♂ 68 mm. long.

† The distal portion is spinose in all the other species figured by Hansen (1922).

key). But, although the specimens examined are too incomplete to permit of a detailed study of the photophores, I am certain that there are more than these. For example, one maxilla had two, another three, on the exopod, and there are nine or ten on the merus of the fourth peræopod. Some of the spots mentioned by Kemp, such as those on the sixth abdominal somite, may also be photophores.

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XL.—Descriptions and Records of Bees.—CLXXXVII.

By T. D. A. COCKERELL, University of Colorado.

Halictus pastinus Cockerell.

There is a group of small species having the aspect of *H. pastinus*, the abdomen with no trace of basal hair-bands or spots on the tergites, the surface of the abdomen with a more or less evident but scanty pale pruinose pubescence. These separate out into five species, as follows :—

- | | | |
|--|----|-------------------------------|
| Area of metathorax closely punctate, giving a minutely reticulate or tessellate appearance | 1. | |
| Area not thus punctate | 4. | |
| 1. Area with a broad shining margin all around; stigma very large, dark reddish; clypeus shining, supraclypeal area dullish. (Weenen.) | | <i>pastiniformis</i> , sp. n. |
| Area without such a margin, but corners may be somewhat shining | 2. | |
| 2. Area crescentic; stigma dark or dusky reddish; small species, about 5.5 mm. long. (Bosrand.) | | <i>pastinellus</i> , sp. n. |
| Area large, approximately semicircular. | 3. | |
| 3. About 5 mm. long; mandibles red. (Montagu Pass.) | | <i>pastinimimus</i> , sp. n. |
| About 8 mm. long; mandibles black. (Natal National Park.) | | <i>pastinus</i> Ckll. |

4. Area large, all dull, with no plicæ; mesonotum polished; face and mesonotum faintly greenish. (Near Oudtshoorn.) *politifrons*, sp. n.
 Area with basal plicæ, but otherwise dull; hind spur with two long spines (style of *H. percinctus* Ckll.) *hirtulinus*, sp. n.

Halictus pastinellus, sp. n.

♀.—Length about 5.5 mm., anterior wing 4.

Black, with the mandibles a little rufescent apically, the flagellum brownish beneath, tegulæ very dark, with a red spot, legs black; hair of head and thorax dull white, thin; head broad; clypeus swollen but not produced, shining, with sparse strong punctures and a median depression; supraclypeal area dullish, hardly more shining than sides of face; front dull, with a shining band along orbits; vertex between ocelli and eyes shining; mesonotum dullish, moderately shining on disc, but not polished, median groove very distinct; scutellum small, feebly bigibbous, the elevations shining; area of metathorax dull, crescentic, with the rounded thickened margin slightly shining; the microscope shows fine punctures, the area resembling that of *H. pastinus*. Wings hyaline, stigma dark brown, nervures pale brown; second cubital cell rather broad, receiving first recurrent nervure at apical corner; third cubital cell hardly broader on marginal than second. Hind basitarsi long; hind spur with two long spines and two rudimentary ones. Abdomen stout, convex, shining, the tergites with linear pale margins, on third and fourth tergites weak apical hair-bands at sides.

Orange Free State: Bosrand, Afdeling Farm (type-locality), March 29–30, 2 ♀ (*J. Ogilvie*); North Bank Halt, Norval's Pont, April 13–14, 2 ♀ (*J. Ogilvie*, *L. Ogilvie*).

Rather like *H. dispositus* Cameron, which has the hair bright white, the stigma dark testaceous, and the apical part of tergites 3 and 4 with much pale hair. It is more like a small edition of *H. pastinus*, differing in the area of metathorax and the character of the hind spur.

Halictus pastiniformis, sp. n.

♀.—Length about 6 mm., anterior wing 5.

Black, the mandibles dark, the flagellum brown beneath, tegulæ small, dark reddish, legs dark brown; hair of

head and thorax thin, dull white ; postscutellum without dense hair ; head broad ; clypeus highly polished, convex, sparsely punctured, with a median depression ; supraclypeal area somewhat shining, but not at all polished ; sides of front moderately shining ; a polished space at each side of ocelli ; mesonotum swollen anteriorly, shining on disc, with well-separated minute punctures on a tessellated surface ; scutellum like mesonotum ; area of metathorax large, dull, with a broad shining margin all around ; posterior truncation shining. Wings faintly dusky, a little darker on apical margin ; stigma large, dark reddish, nervures pale, but the outer ones distinct ; second cubital cell narrow, receiving recurrent nervure distinctly before the end ; third cubital cell hardly produced apically. Abdomen convex, shining, feebly pruinose-pubescent, the tergites with linear, inconspicuous, pale margins, rudimentary apical hair-bands at sides of third and fourth tergites, long pale hair at sides of fourth ; apex of abdomen not reddened.

Natal : Weenen, Feb. 1925 (*H. P. Thomasset*).

Very similar to *H. pastinus*, but easily separated by the smaller, shorter head and smaller, dullish supraclypeal area. The abdomen is quite like that of *H. pastinus*.

Halictus pastinimimus, sp. n.

♀.—About 5 mm. long, anterior wing 4.3.

Black, robust, shining ; mandibles red, with the base black ; head broad ; clypeus shining, with sparse strong punctures and no median depression ; supraclypeal area and sides of face shining, but not polished ; flagellum obscurely brownish beneath ; hair of head and thorax scanty, dull whitish ; mesonotum shining, but not polished, the surface minutely tessellate, with widely scattered small punctures ; scutellum with two shining spots ; area of metathorax with very fine punctures, and no smooth margin ; it is very large and dull, and when seen from behind with a lens the margin presents two little shining spots ; posterior truncation shining ; tegulae very dark brown. Wings hyaline, faintly dusky, stigma pale dusky brown, nervures pale ; second cubital cell much shorter on marginal than third, receiving recurrent nervure at apical corner ; outer recurrent and intercubitus very weak. Legs black. Abdomen broad,

shining, the tergites with inconspicuous linear apical margins; apex with greyish hair, not at all red.

Cape Province: Montagu Pass, Nov. 4, 1931 (*Alice Mackie*).

Like a diminutive *H. pastinus*, with red mandibles.

Halictus mirandicornis, sp. n.

♂.—Length about 8 mm.

Black, slender, the first three tergites with linear, pure white, apical tegumentary bands; clypeus black, mandibles very faintly reddish toward end; antennæ extremely long, entirely black, the flagellar joints strongly swollen beneath; clypeus all black, moderately shining, supraclypeal area dull; head and thorax with much erect dull white hair; mesonotum and scutellum dull, the former a little shining on posterior disc; area of metathorax very large, with only traces of basal plicæ, the surface entirely dull, the narrow margin shining; tegulæ small, rufous. Wings hyaline, slightly dusky, the stigma large, dark red, the nervures light brown; second cubital cell receiving first recurrent nervure some distance from end; third cubital cell very large, very broad on marginal. Legs black, the tarsi rufous at apex. Abdomen with very little hair.

Transvaal: Louis Trichardt, April 4, 1932 (*J. Ogilvie*).

Exceedingly like *H. albolineolus* Meade-Waldo, but easily distinguished by the very much longer, black, moniliform antennæ.

Halictus hirtulinus, sp. n.

♀.—Length about 6.4 mm., anterior wing nearly 4.

Moderately robust, black, the head and thorax with thin whitish hair; mandibles red at end; flagellum brown beneath, becoming red apically; head broad; clypeus shining, convex, with scattered punctures; supraclypeal area, seen from in front, appears black with a shining spot on disc; sides of face moderately shining; mesonotum shining but not polished, the surface minutely lineolate, with very sparse small punctures, closer at sides, median groove not distinct; scutellum shining, not bigibbous, postscutellum also shining; area of metathorax very large, semicircular, entirely dull, with a minutely granular surface and fine basal plicæ

which extend about halfway to the apex and are irregular ; tegulæ very dark brown. Wings hyaline, faintly dusky ; stigma pale yellowish, nervures pale ; second cubital cell broad, receiving recurrent nervure at apical corner ; third cubital equal to second on marginal. Legs black ; hind spur with two long spines (style of *H. percinctus* Ckll.). Abdomen finely pruinose-pubescent, the tergites with no trace of basal bands or spots, apex with long pale hair.

Cape Province : Ceres (type-locality), 2 ♀, Feb. 12-18, 1932 (*J. Ogilvie*, *A. Mackie*) ; Huguenot, Feb. 5-10, 1932 (*J. Ogilvie*).

Very close to *H. pastinus* Ckll., but less robust, with smaller head and narrower face, shining postscutellum, and conspicuously hoary abdomen. The hind spur is quite different. The excessively minute sculpture of the metathoracic area can only be seen with a rather high power of the compound microscope.

Halictus politifrons, sp. n.

♀.—Length about 4·5 mm., anterior wing 3·2.

Black, the face and mesonotum very faintly greenish ; mandibles very obscurely reddish apically ; clypeus and the large supraclypeal area very highly polished, sides of face shining but not polished ; hair of head and thorax scanty, conspicuous and clear white on cheeks ; mesonotum and scutellum polished, postscutellum dull ; area of metathorax large, entirely dull, a high power of the microscope shows an excessively minute granulation or tessellation, there are no plicæ ; tegulæ very dark brown. Wings hyaline, faintly dusky ; stigma pale yellowish, with a rather dark border ; second cubital cell broad, receiving recurrent nervure a considerable distance from end ; third cubital conspicuously broader on marginal than second ; nervures pale. Legs black, hind spur with a strong spine. Abdomen broad, shining black, wholly without hair-bands or spots at bases of tergites, margins of tergites not pallid or fringed, hardly any pruinose pubescence.

Cape Province : near Oudtshoorn, Nov. 1, 1931 (*L. Ogilvie*).

A small species of the group of *H. pastinus*, by reason of the hardly evident greenish colour and the small size

suggesting *H. epichlorus* Ckll., but that has a smaller head, with dull supraclypeal area, and is found in the Katanga.

The following records are new :—

Halictus michaelsoni Friese. Weenen, Natal (*Thomasset*); Norval's Pont, April 16 (*J. Ogilvie*); Palapye Road, March 6 (*J. Ogilvie*).

H. lator Ckll. Ceres, Feb. 12–18 (*A. Mackie*). Differs from type by the black tegulæ, with a little red posteriorly.

H. lactescens Ckll. Ceres, Feb. 12–18 (*J. Ogilvie*); George, Nov. 4–7 (*Cockerell, J. Ogilvie*).

H. tenuilinguis Ckll. George (*J. Ogilvie*). A variety with area of metathorax a little smaller, wings slightly reddish, tegulæ with a reddish spot.

H. shanganiensis Ckll. Bosrand, March 29 (*J. Ogilvie*).

H. pernitens Ckll. Upington, Dec. 7 (*J. Ogilvie*).

H. pallidipennis Smith. Norval's Pont, April 16 (*J. Ogilvie, L. Ogilvie*).

H. plicatinus Ckll. Bluff, Durban, Oct. (*L. Ogilvie*); Zimbabwe, Sept. 30 (*A. Mackie*).

H. norvali Ckll. Matopo Hills, April 17–30 (*A. Mackie*).

H. hypoleucus Ckll. Louis Trichardt, April 4–10 (*A. Mackie*). Variety with broader face.

H. placatus Ckll. Matopo Hills (*J. Ogilvie*). Male.

H. windhukensis Friese. Ceres, Feb. 12–18 (*J. Ogilvie, A. Mackie*). Males.

H. rubricaudis Cam. Windhoek, Dec. 12 (*J. Ogilvie*); Nelspoort, Dec. 2 (*L. Ogilvie*). Males.

H. perileucus C. & I. Otavi (*J. Ogilvie*); Swakopmund, Feb. 6 (*L. Ogilvie*). Males.

H. levibasis Ckll. Norval's Pont, April 12 (*J. Ogilvie*). Male.

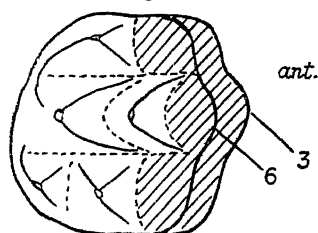
XLI.—*The Post-Canine Teeth of Tritylodon longævus* Owen. By P. M. BUTLER, Department of Zoology, University College, London.

Introduction.

For many years the only known specimen of *Tritylodon longævus* was the skull in the British Museum, which has been studied by many authors, most recently by Simpson (1928). In 1936 Broili and Schröder published

a description of new material, but they were not in a position to compare it with the type-specimen. They found that one of their specimens differed from the others in the possession of additional cusps on the teeth and in other ways, and they concluded that this specimen contained milk-teeth. Professor D. M. S. Watson brought this to my notice, and suggested that I should make a new study of the type-specimen in the light of the findings of Broili and Schröder. Dr. A. T. Hopwood very kindly gave me permission to examine the specimen, and the results seem to be of sufficient interest for publication.

Fig. 1.



The constant elements of the cheek-tooth of *Tritylodon*. Variable region shaded. 6, anterior outline of pc^6 ; 3, anterior outline of pc^3 .

Description of the Teeth.

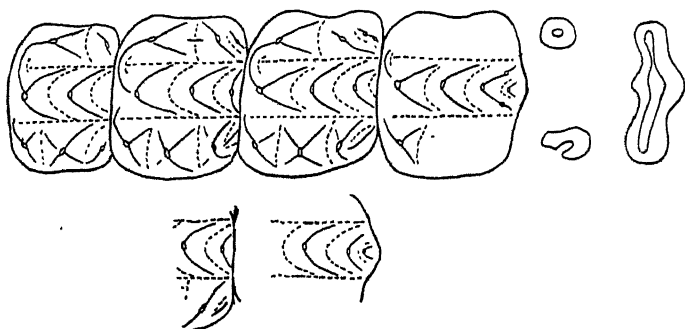
The most important new observation resulting from this study is that the four cheek-teeth of which the crown-pattern can be made out are not all alike. Not only do they differ in outline and proportions, but their cusp-pattern shows a progressive change as it is traced from tooth to tooth along the jaw. In all the teeth the posterior part of the crown seems to have the same form, while the anterior part becomes progressively reduced in the posterior teeth.

The constant posterior part of the crown bears one buccal cusp, two median cusps, and two lingual cusps, arranged as shown in fig. 1. In the place of the posterior median cusp, Simpson's reconstruction (1928, fig. 2 A) shows two cusps, but as this region is greatly worn on all the teeth there is no evidence for this. There seems to be insufficient room for two cusps, and the

material of Broili and Schröder has only one cusp in this position.

The anterior part of the crown is developed to the smallest extent in pc^6 (fig. 2). In the buccal row there is a small, ridge-like cusp; in the middle row there seems to be only a small shelf between the arms of the following cusp; in the lingual row there is another ridge-like cusp.

Fig. 2.



Partial reconstruction of the cheek-teeth of the type of *Tritylodon longævus* Owen. Crowns of right pc^6 – pc^4 , parts of crowns of right pc^3 and left pc^5 and pc^4 , and the roots of right pc^2 are shown.

The anterior buccal cusp is larger on pc^5 , though still smaller than the posterior buccal cusp; on pc^4 it is still larger, and nearly equal to the posterior buccal cusp. A small cuspule occurs on the anterior face of the cusp in pc^5 , and on pc^4 it is better developed. The anterior lingual cusp also increases in size in the series pc^6 – pc^5 – pc^4 , and an anterior cuspule on its anterior face appears on pc^5 and enlarges on pc^4 .

The anterior median region of pc^5 is developed into a small but distinct cusp. On pc^4 (right) this cusp is larger; and on its anterior side may be seen a small ledge. On the tooth of the opposite jaw there is a small anterior cuspule in place of the ledge, and it is probable that on the right side this is partly covered by pc^3 (on the left side the crown of pc^3 is broken off). On pc^3 the anterior median cusp is comparable in size with the median

cusps behind it, and in front of it is another small cusp ; small additional cuspules also occur on its arms.

Thus the anterior parts of each of the three rows of cusps that make up the crown are best developed on the relatively anterior teeth (pc^3 and pc^4), and least developed on the relatively posterior teeth (pc^5 and pc^6).

Simpson omits to give measurements of the teeth, and approximate measurements are accordingly given below (in mm.).

	Length.	Breadth.	Index, length/breadth.
pc^2	7.0 (approx.)	7.2+	.96 (approx.)
pc^3	7.7	8.3	.93
pc^4	7.4	8.1	.91
pc^5	7.0	8.5	.83
pc^6	5.2	7.7	.67

Comparison with the München Material.

The material of Broili and Schröder consists of specimens in the München Institute of Palæontology and Historical Geology. They are described as bearing the following teeth :—

- No. 1936 II. 1. pc^2 – pc^5 , alveoli of pc^1 .
 2. pc^3 , alveoli of pc^1 and pc^2 .
 3. pc^1 – pc^5 .
 4. pc^5 and pc^6 .
 5. Two milk-teeth.

The teeth of the first four specimens are smaller than those of the B.M. specimen : the maximum length ranges from 5.7+ mm. to 6.6+ mm., and the breadth from about 6.0 mm. to 6.5 mm. The patterns of pc^3 – pc^5 do not appear to differ appreciably from those of the type, except that the small additional elements on the anterior edge of the crown cannot be made out ; on all the teeth, therefore, there are two buccal cusps, three median cusps, and three lingual cusps. Pc^2 seems to be similar, except that the anterior cusp of each row is slightly larger than in pc^3 . Pc^1 is somewhat narrower and more pointed anteriorly, but its pattern is essentially the same. As in the B.M. specimen, the median part of the anterior edge of each tooth is overhung by the tooth in front. The anterior

roots of the B.M. specimen seem to be more completely united than those of the München specimens.

The teeth regarded as pc^5 and pc^6 in no. 4 differ from those of the type in being longer than broad, and Broili and Schröder estimate that on pc^6 there were three lingual cusps and three median cusps. The anterior median cusp was probably smaller than the other median cusps, however. Thus pc^6 seems to be better developed than in the type-specimen: whether this indicates a specific difference it is impossible to say.

The most interesting specimen is no. 5, in which the teeth are much smaller: the anterior tooth is *cir.* 4.0×4.5 mm. and the posterior tooth is 5.0 mm. broad. The anterior tooth has three large lingual cusps, together with a small additional anterior cusp; the median row also seems to possess four cusps, the most anterior one being the smallest; in front of the two usual buccal cusps is an additional third cusp. Thus the pattern shows a resemblance to that of pc^3 and pc^4 of the British Museum specimen, and differs from that of the teeth of the other München specimens.

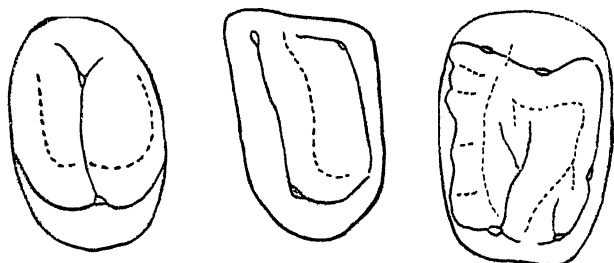
The posterior tooth of specimen 5 seems to have a more poorly developed anterior margin. The anterior lingual cusp is still present, but much smaller, and the same is true of the anterior buccal cusp. The median row seems to have been misinterpreted by Broili and Schröder; it does not seem to contain more than three well-developed cusps. The most posterior median cusp in the British Museum specimen possesses, in addition to the usual V-like ridges, an additional pair of ridges near the posterior edge of the crown (see fig. 1), and there is no reason to suppose that more than one cusp was present in this region of the crown. The same argument applies to the posterior tooth of specimen 5, which would therefore appear to be very similar to pc^4 of the type-specimen.

The view that the teeth of specimen 5 are milk-teeth is based on the following evidence: the small size, the slenderer and higher cusps, the additional anterior cusps, the more slender roots, and the presence of a space below them that could have been filled in life by the replacing teeth. The type-specimen, though undoubtedly young, as pc^6 is incompletely erupted, has larger teeth than any

of the München specimens, and the roots and cusps are not particularly slender. The presence of additional anterior cusps may be merely an individual variation. The type-specimen is unfortunately too thick to permit of the taking of X-ray photographs, and it is impossible to say whether any spaces were present below the teeth.

A comparison of the British Museum specimen with the new material indicates that *Tritylodon* is a variable form, perhaps containing more than one species. The main variable characters are the size of the teeth, the degree of development of the anterior edge of the crown, the degree of separation of the anterior roots, and perhaps the proportions of the teeth. All the specimens have a basic cusp-formula of 2-3-3, modified by the tendency for the anterior cusp of each row to be reduced in size on the posterior teeth in at least one specimen, and by a development of small anterior additional cusps on the anterior teeth of two specimens.

Fig. 3.

*Trirachodon.**Cf. Trirachodon.**Diademodon.*

Crown-patterns of cheek-teeth of three Therapsid reptiles with broad crowns. I am indebted to Dr. F. A. Parrington and Professor D. M. S. Watson for permission to use material in their possession as a basis for these diagrams.

Relationships of Tritylodon.

The serial sequence of patterns of the cheek-teeth of *Tritylodon* differs from that of all mammals except perhaps the Multituberculates. In Triconodonts, Pantotheres, Insectivores, and other mammals it is the posterior part of the crown that is lost or reduced in the posterior cheek-teeth (Butler, 1939), while in *Tritylodon* the anterior part of the crown is lost. The crown-pattern is also

quite unlike that of all other mammals, again with the exception of the Multituberculates, and the arrangement of roots is also peculiar.

A more detailed study of the teeth of Therapsid reptiles might throw some light on the problem. There appears however, to be no similarity in the crown-pattern of *Tritylodon* to that of any known reptile (fig. 3), and the teeth show the mammalian character of the division of roots. The mode of reduction of the teeth at the posterior end of the jaw has been investigated in only a few genera of reptiles, e. g., *Diademodon* (Watson, 1913), and these do not seem to show any close similarity in this respect to *Tritylodon*.

The isolated character of *Tritylodon* indicates that a great deal remains to be discovered about the evolution of the Therapsids in the Trias and the origin of the mammals.

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XLII.—*Faunistic Notes from the South Coast of County Cork, Eire.* By Professor L. P. W. RENOUF.

Further Notes on Nudibranchs and Tectibranchs.

The interest attaching to these two groups of molluscs continues to increase. The finding of three species new to the Lough Ine (I) area during the Easter Vacation last year brings the total number of species up to fifty-seven. The new species are:—*Lamellidoris luteocincta* A. & H., *Onchidorus depressa* (A. & H.), and *Onchidorus oblonga* (A. & H.). In addition *Galvania farrani* A. & H. was recorded for the second, *Armina loveni* (Bergh) for the third time, while *Archidoris britannica* (John.) and *Calma glaucoides* (A. & H.) were unusually abundant.

This Easter, too, *Archidoris* and *Calma* were unusually abundant, as were *Goniodoris nodosa* (Mont.) and *Polycera quadrilineata* (O. F. M.), although nudibranchs on the whole, as well as many other forms, were much scarcer than usual. The plankton in particular was extraordinarily poor, even after ten days or so of bright weather. It is presumed that this was due to the exceptionally long period, from Autumn to Easter, during which there was but very little actual sunshine.

Easter last year discovered also *Acera bullata* (Muller) in large numbers, the first record since 1935, while this Easter *Aplysia punctata* Cuvier was abundant both in the Lough and at Tragemona. *Pleurobranchus plumula* (Mont.) occurred in its usual moderate numbers during both periods, but there has been no recurrence of *Pleurobranchus membranaceus* (Mont.) since 1934 (2).

Hiatella arctica (L.) and *Phoronis hippocrepia* Wright
boring into Coralline Algæ.

Cleft pools on the open Atlantic aspect of Carrigathorna, the rocky point which forms the western boundary of the mouth of Barloge Creek leading to Lough Ine, are thickly lined with corallines. Some of these are two inches or more in thickness and are used by *Hiatella arctica* (L.) as if they were limestone, the only sign of the molluscs being the bright red siphons, which may protrude just beyond the surface of the alga, or the holes which are visible when the animals contract.

Within the Lough itself *Phoronis hippocrepia* Wright may be found both where the encrusting corallines are thick and where *Pomatoceros triqueter* (L.) occurs in such numbers that the crowded tubes form a more or less solid mass of calcium carbonate. In both cases the delicate parchment-like tubes of *Phoronis* are deeply embedded in the "rock," with only a very short region of their distal ends protruding—so short that they are very easily overlooked.

Tealia felina (L.) using Fragments of Algæ
instead of Shingle.

Some of the clefts far back in the cave, which penetrates the eastern aspect of Bullock Island at the entrance
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to Barloge Creek, harbour a few specimens of *Tealia felina* (L.). These are of average size and usually exhibit the normal characteristics. Last August, however, isolated specimens in clefts rather high up were found camouflaging themselves with small pieces of algæ instead of the usual fragments of shingle. Presumably these were easier to "obtain" than shingle in these particular situations.

Holothuria forskali Delle Chiaje in the Intertidal Region.

Last August a large specimen of *Holothuria forskali* Delle Chiaje was found on the top of Cytoseira on the southern aspect of the rocks at the eastern end of Castle Island in Lough Ine. This is the second time that this species has been found in the intertidal region in our area, the previous record being in April 1930, when a member of Professor D. Laurie's class found a specimen on the islets in the mouth of Barloge Creek.

Spreading of Codium tomentosum Stackh, and of certain other Species in Lough Ine.

For the past three years it has been obvious that the limit of high water in Lough Ine has been steadily advancing upshore. This is particularly noticeable in the Goleen, where salt-marsh conditions are extending rapidly. Especially evident is the advance which has been made up the field bounding the Goleen to the south by *Juncus maritimus* Lam.

Owing to this upward movement of the tide some species have considerably extended their range along the shores of the Lough, sponges of several genera in the lead. Most prominent, as is to be expected, are *Halichondria panicea* (Pallas) and *Hymeniacidon sanguineum* (Grant), in the Goleen, along the south shore, from the north-west face of Castle Island round to the strand on the south, on the rocks between the eastern end of the island and the mainland, though *Amphilectus fucorum* Johnst. is not far behind them.

The biggest change in the general appearance of the shore-line is due, however, to the remarkable way in which *Codium tomentosum* Stackh. has spread. Previously confined to a few points, this beautiful green alga is now

one of the outstanding features of large stretches of the shore, including practically the whole of the south shore and the major part of the west shore. It first became prominent during the summer of 1937, and is now one of the most outstanding inhabitants of the Lough.

MEDUSÆ.

During late summer last year *Æquorea forskalea* Peron et Lesueur was unusually abundant in both Barloge Creek and the Lough, while *Chrysaora isosceles* (L.) was numerous not only in our area but also in other areas, off Bangor, North Wales, for instance. *Aurelia*, however, has not yet made a re-appearance, although it was present in large shoals in the open to the west of Barloge and was carried up the River Lee almost into the city of Cork.

Inachus leptochirus Leach partly crippled by Sponges.

A half-grown specimen of *Inachus leptochirus* Leach, found last Easter just below the rapids at Lough Ine, bore a number of small patches of sponge on its carapace and some of its limbs, so small and scattered that they in no way masked it. In spite of this, however, the second and third pereopods on the right side were firmly bound together for more than half their length by one long patch, so firmly that the limbs could not bend.

This occurrence has thoroughly aroused doubts which I have had for some time concerning the alleged protection against fish which sponge and algal growths are generally said to afford, to *Inachus*, *Macropodia*, etc.

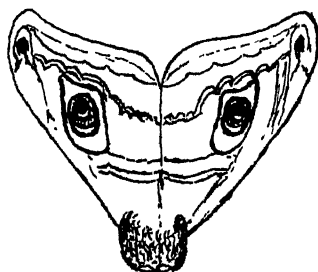
In the Lough Ine area both *Inachus* and *Macropodia* occur in the intertidal region, especially the former. In practically all cases *Inachus* bears sponges, *Macropodia* algæ, but what fish are there in such a region to prey upon them? Surely not *Cottus*, *Centronotus*, *Blennius* or *Motella*? Is the generally accepted idea supported by stomach contents? At one period I examined a great many samples from the stomachs of cod, saithe, herring, mackerel, plaice and other flat-fish, *Scyllium* and *Acanthias*, but I have no recollection of finding remains of either *Inachus* or *Macropodia* in them, although both genera are abundant in the Clyde Sea Area from which the fish came. Possibly spider-crabs were not "in

season" during the periods at which I made the examinations, for one point which was strikingly obvious was that feeding depended very largely on what was available.

My first doubts in this matter were raised by the fact that in the Lough Ine area, at least, *Inachus* may bear, not only several different species of sponge, but species of such strikingly different colours as dull yellowish-ochre and bright red-orange, growing in such a way that they clearly constitute a more or less permanent covering, so that there can be no suggestion that the specimens in mind happened to be changing their garb.

Saturnia carпинi Bork resembling *Putorius ermineus*.

That the eye-like markings on the wings of Lepidoptera and other insects have a protective value, because birds are so deceived by them that they direct their attack



Saturnia carпинi mimicking stoat. Full-face.

to the parts which bear them, and that those which are borne by some larvæ cause them to appear to have enormous heads when they assume the "terrifying" attitude, is well known. Nowhere, however, have I seen it suggested that something like this latter effect is produced by the "eyes" on insects' wings. I had no suspicion of this fact myself until a few weeks ago, when I was passing the bench at which one of my senior students, Mr. C. Wood-Baker, was working at Lough Ine, on some insects which he had caught. One of these was a newly emerged *Saturnia pavonia* which he had just taken out of the killing-bottle and put on the bench with its anterior end towards the working edge of the bench, but where it was partly in the shade. So

striking a resemblance to a stoat full-face on did it present that I stopped and looked at it carefully. Though this, as was to be expected, reduced the first striking effect to some extent, it brought several unexpected points to my notice. Among these were the following:—The paler oblong markings round the "eyes" proper help to give the characteristic stoat-like expression; the dense covering of hair-like scales on the head and thorax produce contour and shadows which heighten the effect of "snout," while two very small paler areas at the extreme anterior end are remarkably like nostrils.

Is it safe to assume that an Emperor Moth resting head-downwards near the ground may be mistaken by birds for their dread enemy the stoat?

Early Appearance of Arctia fuliginosa Linn.

A newly emerged specimen of the Ruby Tiger was found by my pupil, Mr. C. Wood-Baker, on April 20th, on moorland between Lough Ine and Tralispean.

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XLIII.—*Beiträge zur Kenntnis der Conopiden.*—III.

Von O. KRÖBER, Hamburg.

(Continued from p. 468.)

PHYSOCEPHALA Schin.

Männchen.

- | | |
|---|----------------------------|
| 1. Stirn ganz schwarz | 2. |
| Stirn ganz oder teilweise gelb | 3 |
| 2. Untergesicht ganz schwarz oder schwarz-braun, mit gelben Gesichtsruben. Abdomen ganz schwarz, nur an der Basis des 3. Ringes weiss schimmernd .. | <i>P. carbonarius</i> Big. |
| (Abdomen an der Grenze des 2. und 3. Tergits rotbräunlich. Toment gelblich— <i>P. analis</i> F.) | |
| (M. E. sind beide synonym. Die Grösse schwankt zwischen 11 und 18 mm.) | |

- Untergesicht teilweise gelbe. Abdomen schwarz und rotbraun. Flügelbinde reicht bis r_5 ; 4. Hinterrandzelle grösstenteils hyalin; 6. Längsader schwarz gesäumt. Brustseiten hellrotgelb. Schildchen und Hinterrücken dunkelbraun. Abdomen an der Basis des 2. und 3. Tergits rostrot. 1. Fühlerglied rotbraun *P. bicolor* Krb.
3. Kiel gelb 4.
- Kiel schwarz 10.
4. Backen einfarbig schwarz oder braun. 5.
- Backen braun mit gelbem Fleck. Strieme mit T-Zeichnung 7.
5. Flügelbinde teilweise rostrot *P. segethi* Rond.
- Flügelbinde braun *P. sororcula* Will.
6. Schwingerknöpfchen hellgelb mit schwarzem Fleck 7.
- Schwingerknöpfchen ganz gelb, ohne Fleck 8.
7. Grosse rostrote Art. Schildchen und Hinterrücken rotbraun *P. rufus* Will.
- Kleine zierliche tiefschwarze Art mit grösstenteils rotbraunen Fühlern und tiefschwarzem Schildchen *P. bipunctata* Macq.
8. Schwarze Art mit meistens hellrotbraunem Schildchen (variabel!) *P. bimaculata* Krb.
- Pechbraune Arten 9.
9. Grosse plumpe Art von 18 mm. Toment des Thorax weisslich. Gesicht pechbraun *P. piciventris* v. d. W.
- Kleine zarte Art von 14–15 mm. Toment des Thorax gelb. Gesicht hellgelb *P. soror* Krb.
10. Backen einfarbig schwarz oder braun. Flügelbinde und Längsadern grösstenteils rostrot *P. nervosa* Krb.
- Backen braun mit gelbem Fleck 11.
11. Grosse, vorherrschend hellbraune Art von 16 mm. *P. testacea* v. d. W.
- Kleine, vorherrschend schwarze Art von 11 mm. *P. bipunctata* Macq.

Unberücksichtigt blieben *P. xanthops* Will. und *P. texana* Will.

Weibchen.

1. Stirn ganz schwarz 2.
- Stirn ganz oder teilweise gelb 5.
2. Untergesicht ganz schwarz oder schwarzbraun. Gesichtsruben hell 3.
- Untergesicht ganz oder teilweise gelb 4.
3. Schwinger und Hüften schwarz. p braun, z. T. hellgelbbraun. Flügel bis zur 5. Längsader schwarzbraun. 13–14 mm. . *P. analis* F. (? *carbo-* [naria Big.].)
- Schwinger gelb, Hüften pechbraun. Haftläppchen und Klauen ganz schwarz. 14 mm. *P. picipes* Krb.

- Schwinger gelb und schwarz, Hüften rotgelb. *p* vorherrschend hellrotgelb, schwarzbraun. Haftlappen und Klauen hellgelbbraun. 14 mm.
4. 1. Fühlerglied doppelt so lang wie breit. *P. brunnipes* Krb.
1. Fühlerglied 4 mal so lang wie breit *P. vespiformis* Krb.
P. brasiliensis Krb.
5. Kiel gelb 6.
Kiel schwarz 12.
6. Backen einfarbig braun oder schwarz 7.
Backen braun mit gelbem Fleck. Stirn mit T-Zeichnung 8.
7. Flügelbinde teilweise rostrot *P. segethi* Rond.
Flügelbinde schwarzbraun *P. scorocula* Will.
8. Brustseiten ohne Schillerstrieme. Grosse Art von mindestens 19 mm. Thorax, Hinterrücken und Schildchen rotbraun.. *P. rufus* Will.
Brustseiten mit Schillerstrieme 9.
9. Schwingerknöpfchen mit schwarzem Fleck. Torment messinggelb. Zierliche schwarze Art mit grösstenteils rotbraunen Fühlern und tiefschwarzem Schildchen *P. bipunctata* Macq.
Schwingerknöpfchen hellgelb, ohne schwarzen Fleck 10.
10. Schwarze Art mit meistens rotbraunem Schildchen *P. bimaculata* Krb.
Hellere, braune Arten 11.
11. Einfarbig zimtbraune Art *P. testacea* v. d. W.
Grosse, plumpe, schwarzbraune Art. Ende des 2. und das ganze 3. Abdominalsegment leuchtend rotbraun, event. Ende des 2.-6. Tergits rotgelb. Schildchen und Hinterrücken schwarz *P. piciventris* v. d. W.
12. Backen braun mit hellem Fleck *P. bipunctata* Macq.
Backen einfarbig schwarz oder braun 13.
13. Schwinger ganz schwarz *P. unicolor* Krb.
Schwinger ganz oder teilweise gelb 14.
14. Schwinger ganz gelb *P. picipes* Krb.
Schwinger gelb mit breitem, schwarzem Rand. Flügelbasis bis zur 1. Hinterandzelle intensiv rotgelb, der Rest hyalin *P. pulchripennis* Krb.

Unberücksichtigt blieben *P. maxima* Gigl.-Tos, *texana* Will., und *xanthops* Will.

Es liegen vor:

P. rufus Will. aus N. Teutonia in Brasilien (das ♂ ist sicher syn. mit *rufithorax* Krb. Will. beschrieb seine Art als *Conops*!).

P. segethi Rond., Chile, Alhué.

Bei dieser Gelegenheit möchte ich erwähnen, dass *P. burgessi*, *texana*, *tibialis*, *furcillata*, *sagittaria*, *castanoptera* den gleichen vertieften glatten Keilfleck am hintern Augenrand tragen wie *Conops fronto* Will.

STYLOGASTER Macq.

(Tabellen nach Aldrich, Proc. U. St. Nat. Mus. vol. 78,
pp. 1-27 (1930).

Males.

- | | | |
|---|-----|---------------------------|
| 1. Ocellar triangle long, almost or quite reaching lunule, shining | 2. | |
| Ocellar triangle much shorter, rarely extending a little beyond middle of front | 4. | |
| 2. t_2 with brush of long black hair on apical half of flexor side | 3. | |
| t_2 plain (Panama) | | <i>indistincta</i> Aldr. |
| 3. Middle basitarsus with a row of half a dozen erect black spinose hairs on a swelling on anterior side before middle; front coxæ with a tuft of hairs at tip which are black in front, pale behind (Brazil) | | <i>ornatipes</i> Krb. |
| Middle basitarsus straight, without swelling but with a few black hairs on anterior side; front coxæ with only a few hairs at tip (Costa Rica) | | <i>decorata</i> Aldr. |
| 4. 1. abdominal segment pale at sides where the lateral bristles arise | 5. | |
| 1. abdominal segment black at sides where the lateral bristles arise | 12. | |
| 5. Abdomen yellow with faint brown bands on hind margins of the segments (Amer. sept., Mexico) | | <i>biannulata</i> Say. |
| Abdomen much darker | 6. | |
| 6. 3. antennal joint on outer side fully three times the 2.; lateral bristles of 1. and 2. abdominal segments wholly pale (British Guiana) | | <i>fasciata</i> Aldr. |
| 3. antennal joint not over twice the 2.; lateral bristles of 1. and 2. abdominal segments mostly black | 7. | |
| 7. Abdomen unusually short and broad, 2. segment shortened in middle of dorsum; 3. paler in color with a narrow transverse band in middle, approaching the hind margin at sides (British Guiana) | | <i>breviventris</i> Aldr. |
| Abdomen of usual form; not as described. | 8. | |
| 8. Front except narrow lateral margins of uniform reddish-brown colour, ocellar triangle very short, rounded off close to median ocellus; mesonotum with ill-defined median wide brown stripe (Panama) | | <i>curranii</i> Aldr. |
| Front and mesonotum not as described. . . | 9. | |
| 9. 1. posterior cell not wider than submarginal, last section of 4. vein nearly straight; proboscis yellow halfway to geniculation. | 10. | |
| 1. posterior cell wider than submarginal, last section of 4. vein strongly bowed; | | |
| proboscis yellow only at the base | 11. | |

10. Hind edge of last sternite with a complete transverse comb-like row of backwardly directed black spinules, and just before this a pair of small groups of black setules, less conspicuous; outer forceps swollen, white, with a long, slender yellow apical process extending across the median line (Central America) *pectinata* Aldr.
 With no apparent spinules on last sternite; the outer forceps slender with jagged tips, without such processes (Central America) *rectinervis* Aldr.
 11. Front coxæ with brush of long pale hair at tip (Brazil) *stylata* F.
 Front coxæ with black hair at tip (Mexico, Central, and South Amer.) *stylosa* Towns.
 12. Last sternite with a small cluster of black setules on each side of the median rounded notch (Mexico, Central America). *minuta* Towns.
 Last sternite not with clusters of setules... 13.
 13. Middle third of f_3 and penultimate fifth of t_3 whitish, well defined (Panama) *banksi* Aldr.
 f_3 and t_3 almost unicolorous, brownish (Honduras) *apicalis* Aldr.

Females.

1. Ocellar triangle long, almost or quite reaching lunule, shining 2.
 Ocellar triangle much shorter, rarely extending a little beyond middle of front... 4.
 2. Lateral bristles of 1. abdominal segment wholly pale 3.
 Lateral bristles of 1. abdominal segment mostly black (Peru) *peruviana* Aldr.
 3. Hind crossvein almost parallel with hind wing margin; t_3 strongly annulate with white near tip (Mexico, Central America). *ethiopa* Towns.
 Hind crossvein nearly erect, t_3 not annulate with white (Panama) *panamensis* Aldr.
 4. 2. and 3. abdominal segments wholly yellow (Bolivia) *abdominalis* Krb.
 Abdomen yellow with faint dark apical bands on all segments (Amer. sept., Mexico) *biannulata* Say.
 Abdomen much darker 5.
 5. 1. abdominal segment with only pale bristles at sides 6.
 1. abdominal segment with coarse black bristles at sides 7.
 6. 2. segment of ovipositor snow white and with white hair on basal half or more (Panama) *speciosa* Aldr.
 2. segment of ovipositor black on basal half; front wholly yellow on anterior third or half; 4. vein greatly bowed, joining 3. almost at a right angle (Brazil). *stylata* Towns.
 7. Front uniform reddish brown in colour except narrow sides; ocellar triangle

- very short, hardly continuing beyond median ocellus (Panama) *currani* Aldr.
- Front yellow on anterior edge, gradually becoming black upwards, ocellar triangle equilateral, extending beyond median ocellus only about twice the width of the latter (Mexico, Central America) *stylosa* Towns.
- Front dark, at least above; ocellar triangle more acute anteriorly 8.
8. Abdomen unusually short and broad; 3. segment rather pale, with narrow arcuate black crossband near middle which curves backward near sides (Dutch Guiana) *breviventris* Aldr.
- Abdomen of ordinary form, not with such crossband 9.
9. 2. segment of ovipositor snow white except base (Panama) *apicalis* Aldr.
2. segment of ovipositor not white 10.
10. t_3 with distinct band of white ground-color on penultimate fifth (a little obscured by dark hairs) (Panama) *banksi* Aldr.
- t_3 not banded 11.
11. The lateral black bristles of the 1. abdominal segment arise from a spot of dark ground color (Mexico, Central America). *minuta* Towns.
- The lateral black bristles of the 1. abdominal segment arise from an area of white ground color (Central America)... *rectinervis* Aldr.
- St. ornatipes* Krb. liegt vor aus Brasilien, Nova Teutonia, 10. 7., 4. 12.
- St. ethiops* Towns. aus Brasilien, Nova Teutonia, 13. 9.-16. 9.
- St. decorata* Aldr. aus Brasilien, Nova Teutonia, 20. 11.
- St. breviventris* Aldr. aus Brit. Guiana, Essequibo Moraballi, 4. 11.-20. 11.
- St. rectinervis* Aldr. oder sp. n., Brit. Guiana, Essequibo Moraballi, 17. 11. Brasilien, Nova Teutonia, 27. 2.-7. 7.
- St. aff. apicalis* Aldr., Brasilien, Amazonas.
- St. spec. n.* vom Amazonas.

PARAZODION Krb.

Weibchen.

1. Thorax grüspanfarben mit 2 breiten schwarzen Striemen bis zum Hinterrand des Schildchens. Abdomen bläulich zementgrau. *p* schwarz *Schmidtii* Krb.
- Thorax schwarz, weisslich bereift, unklar gestriemt. Abdomen lilarötlich. *p* bleich bräunlich. Schildchen mit 4 Randborsten *pallidetinctum*, sp. n.

Männchen.

- . Behaarung des Körpers dicht und lang schwarz. Fühler düster rotbraun. Thorax grüspanfarben mit je 2 Doppelstriemen, die inneren bräunlich, die äussern tiefschwarz, und 1 Fleckenstrieme an der Seite. Schildchen mit 4 Randborsten *pilosum*, sp. n.
- Behaarung wenig auffällig. Fühler tiefschwarz. Thorax mit 2 breiten sammetschwarzen Längstriemen, die bis zum Hinterrand des Schildchens reichen und zwischen denen die Anfänge von 2 braunen feinen Linien liegen. Ausserhalb eine Fleckenstrieme 2.
2. Art von 4·5 mm. Die Dreiecke des 2. Tergits erreichen den Vorderrand nicht, sind vorn bis zum Seitenrand verbreitert. Schildchen mit 4 Randborsten *affinis*, sp. n.
- . Art von 6·5 mm. Alle Dreiecke der Tergite erreichen den Vorderrand *Schmidti* Krb.

P. pallidetinctum, sp. n., ♀ vom Amazonas. Type: Brit. Mus.

Untergesicht blassgelb. Fühler bleichrotgelb, 2. Glied mindestens $2\frac{1}{2}$ mal so lang wie das 1. Thorax schwärzlich, weiss bereift, ohne klare Striemung. Schildchen und Hinterrücken lilarötlich, weisslich bestäubt. Pleuren und *p* bleich bräunlich, glanzlos. Abdomen bleich lilarötlich, durch weisslichen Reif grau erscheinend. 1.–5. Tergit mit sammetschwarzem Doppeldreieck, zwischen denen eine feine helle Längsline liegt. Alle Hinterrandsäume hell. Die Flecken des 2. Ringes sind mehr oder weniger quadratisch. 6. Segment hell lilarötlich, ohne Zeichnung. Legeröhre sichelförmig, glänzend hell rotgelb. Bauchseite an Stelle der Theka mit einer schwarzen Platte. Flügel graulich hyalin. Adern zart, braun. 1. Hinterrandzelle offen. 6 mm.

P. pilosum, sp. n., 3 ♂, von Vera Cruz, Atoyac, Guerrero-Xucumanatlan, vii. Type: Brit. Mus.

Hat grosse Ähnlichkeit mit *Zodion pictum* Wied.! Kopf dunkelrotgelb, bei einem ♂ ein kleiner Fleck unterhalb der Augen. Gesichtsgruben etwas bräunlich, mit dichtem, gelbem Schimmer bedeckt. Stirn und Scheitel rotgelb, die Mitte mehr oder weniger verdunkelt. Kopfzeichnung wie bei *Zodion*. Fühler düster rotbraun, 2. und 3. Glied gleich lang. Rüssel schwarz, an der Basis rotbraun, ca.

doppelt so lang wie der Kopf. Taster winzig klein, rotbraun. Thorax grüspanfarben, mit je 2 Doppelstriemen, die inneren bräunlich, die äusseren tief sammet-schwarz, und mit einer ausserhalb gelegenen kaum erkennbaren Fleckenstrieme. Schildchen und Hinterrücken graugrünlich. Pleuren graugrün mit gelblichem Hauch, *p* schwarz, graubräunlich tomentiert. Vorderhüften grauschimmernd. Schüppchen weiss, Schwinger gelblich. Flügel grauhyalin, schwarzadrig. 1. Hinter-randzelle offen. Hinterleib bläulichgrau oder graugrünlich, je nach der Beleuchtung. 1. Ring einfarbig, hell oder schwärzlich schimmernd, je nach der Beleuchtung. 2.-4. mit je 2 sammetschwarzen Makeln, die des 1. am kürzesten. Sehr dicht stehende schwarze Behaarung täuscht am 2. Ring einen wagerecht liegenden Seitenfleck vor. Analsegment etwas bräunlichgrau. Genitalien glänzend schwarz. Der ganze Körper ist für ein ♂ ziemlich breitgebaut. Behaarung ziemlich dicht, schwarz. 2 offenbar unreife Tiere haben rotbraune *p*. Bei einem derselben sind am 3. Tergit die schwarzen Flecken zu einem zusammengefloßen. 5 mm.

P. affinis, sp. n., ♂ von Brasilien, Nova Teutonia, 1. 7.-7. 8. Type: Brit. Mus.

Grosse Anhlichkeit mit *Zodion aureopygium* Krb. und *brasilianum*, sp. n., aber das ♂ hat des Analsegment der Länge nach gespalten, gehört also zu *Parazodion*. Kopf satt rotgelb. Untergesicht und Augenrand bis zu den Sammetmakeln der Stirn bleich goldgelb schimmernd. Gesichtsgruben schwarz, weisslich tomentiert. Die weisslich tomentierten Scheitelflecken sind sehr klein. Oben am Hinterkopf stehen 4 lange schwarze Borsten. Sonst ist alle Behaarung kurz, schwarz. Hinterkopf gelbgrünlich, zwischen den schwarzen Streifen mehr gelblich. Fühler tiefschwarz, 2. Glied wenig länger als das 3. Rüssel schwarz, zweimal kopflang. Thorax gelblich oder grünlichgrau mit 2. breiten, tiefschwarzen Längsstriemen, die aufs Schildchen übertreten und am Rand tiefschwarz verbunden sind. Hinterrücken gelblichgraugrün. Zwischen den 2 Thoracalstriemen liegen 2 feine abgekürzte braune Linien, ausserhalb eine blasse, in 2 Flecken aufgelöste Strieme. Pleuren mehr bläulichgrün. *p* schwarz, grau bestäubt. Basis von $t_1 + t_2$ mehr oder

weniger bräunlichgelb. Haftläppchen bräunlich, weiss schimmernd. Schwinger und Schüppchen weisslich. Flügel hyalin, Adern stark, schwarz. Vorderrandzelle und Basis bräunlich. Abdomen weisslichgrau mit grünlichem Anflug. 1. Ring z. T. verdunkelt, mit hellem Mittelstrich; 2.-4. mit je 2 sammetschwarzen Dreiecken. Die des 2. erreichen den Vorderrand nicht, sind vorn bis zum Seitenrand erweitert. Die des 4. und 5. sind breit getrennt und reichen gleich denen des 3. Ringes bis zum Vorderrand. Analsegment graubräunlich, tief gespalten. Genitalien glänzend schwarz. Die Zeichnung des 2. Ringes ist manchmal undeutlich, der vordere Seitenzweig wird zu einem mehr oder weniger isolierten Fleck. 1. Basalzelle mehr oder weniger bräunlich. 4.5 mm.

ZODION Latr.

Männchen.

- | | |
|---|------------------------------------|
| 1. Flügel schwarzgefleckt. 6.5-8 mm. | <i>Z. punctipennis</i> Krb. |
| Flügel ungefleckt | 2. |
| 2. Abdomen total rotgelb | 3. |
| Abdomen schwarz, event. die letzten Ringe goldgelb oder rotgelb | 4. |
| 3. Thorax mit 3 breiten schwarzen Längstriemen. Toment goldgelb. Schildchen mit 12 Randborsten. 6-9.5 mm. Fühler tiefschwarz. <i>p</i> tiefschwarz | <i>Z. dibaphus</i> Krb. |
| Thorax gelbweiss mit 2 schwarzen Striemen. Fühler rotgelb; <i>p</i> rotgelb. Schildchen mit 4 Randborsten | <i>Z. obliquefasciatum</i> [Macq.] |
| 4. Abdomen am 1. und 2. Tergit schwarz, sonst goldgelb, mit feiner schwarzer Querzeichnung am 3.-5. Tergit. Thorax mit 2 kurzen gelben Striemen. Schildchen mit 6 Randborsten. 8 mm. | <i>Z. zebrinum</i> Big. |
| (Hierher gehören sicher <i>Z. auricaudatum</i> Will. und <i>Z. aureopictum</i> Krb. als Synonym.) | |
| Arten, bei denen nur die letzten Segmente rotgelb sind oder goldgelbes oder blassgelbes Toment tragen | |
| 5. Die letzten Tergite oder die Genitalien sind rotgelb | 6. |
| Die letzten Tergite sind grauschwarz, event. gold- oder blassgelb tomentiert. Die Genitalien sind dunkelrotbraun bis schwarz | 8. |
| 6. Kleine Arten von 3.5-4.5 mm. Thorax mit 2 feinen Mittellinien und seitlichen Fleckenstriemen | 7. |
| Grosse Art von 7 mm. Hinterleib gelbgrau. Thorax mit 2 starken tiefschwarzen Striemen und 1 kurzen Strich dazwischen. Schildchen mit 12 Randborsten | <i>Z. analis</i> Krb. |

(Hierher nach Mall. *Z. flavocaudatum* Big., die aber nach der Beschreibung am 4. bis letzten Abdominalsegment ganz gelb sein soll (entièrement jaune!) der Thorax soll 2 tiefschwarze Striemen tragen und 2 kurze dazwischen.)

7. 2.-4. Tergit sammetschwarz mit grauem Seitenfleck. Thorax blaugrau mit 2 feinen schwarzen Mittellinien und je einer breiteren, in 2 Flecken aufgelösten Seitenstrieme. *Z. americanum* Wied.
 1. und 2. Tergit grüspanfarben, ungefleckt; 3. mit 2 schwarzen Flecken; 4.-5. mit 2 schwarzen Dreiecken. Schildchen mit 4 Randborsten *Z. costaricensis* Krb.
 8. Thorax mit 4 klaren, feinen, schwarzen Längslinien. Schildchen mit 4 Randborsten *Z. pictum* Wied.
 9. Thorax mit 3 Längsstriemen. Schildchen mit ca. 12 langen, dichtstehenden Randborsten [anum Krb.
 - Thorax mit 2 breiten Striemen, event. mit 2 feinen dunklen Linien dazwischen. *Z. analis* var. *peruvi-*
 10. Analsegment matt graubraun. Genitalien schwarz. Jedes Tergit mit einem grossen, schwarzen Mitteldreieck mit abgebrochener Spitze, das bis zum Seitenrand reicht (scheint 4 Randborsten zu haben) 10.
 - Analsegment satt goldgelb. Genitalien rotbraun. *Z. triangularis*, sp. n.
 11. Thorax mit 2 breiten tiefschwarzen Längsstriemen auf bläulichem Grund und 2 feinen, blasseren dazwischen. Alle Tergite mit 2 unklaren schwärzlichen Dreiecken. Schildchen mit 6 Randborsten. 11.
 - Thorax mit nur 2 Längsstriemen *Z. aureopygium* Krb.
 12. Abdomen ohne jede Zeichnung. Thorax mit 2 schmalen Linien auf gelbbraunlichem Grund; dazwischen die Schatten von 2 weiteren und gleichfalls aussen eine hauchfeine bräunliche Linie. Scheinbar 6 Randborsten 12.
 - Abdomen mit breitem Mitteldreieck ohne Spitze am 2. und 3. Tergit, das des 3. Tergits ist durch eine weissliche Tornentpartie gespalten *Z. grisescens*, sp. n.
 - *Z. pygmaeum* Will.
- Weibchen.
1. Flügel schwarzgefleckt *Z. punctipennis* Krb.
 - Flügel ungefleckt 2.
 2. Thorax mit 2 oder 4 Striemen 3.
 - Thorax mit 3 Striemen 8.
 3. Kleine Arten von 3-5 mm. Thorax grüspanfarben mit 2 feinen Mittelstriemen und 2 in Flecken aufgelösten Seitenstriemen 4.
 - Grosse Arten von 5-5-6-3 mm. 6.
 4. Analsegment rotgelb 5.
 - Analsegment schwarz. Schildchen mit 4 Randborsten *Z. pygmaeum* Will.

5. 1. Hinterrandzelle offen. Schildchen mit 4 Randborsten *Z. americanum* Wied.
 1. Hinterrandzelle geschlossen. Schildchen mit 4 Randborsten. 4-4.5 mm. *Z. abitus* Wied.
6. Thorax mit 2 breiten, tiefschwarzen Längstriemen, dazwischen 2 feine, dunkle Linien. Analsegment und Theka glänzend, tief schwarz. Schildchen mit 4 Randborsten. 4 mm. *Z. brasiliensis*, sp. n.
 Thorax mit 2 oder 4 schmalen schwarzen Längstriemen und 2 breiteren Fleckenstriemen an der Seite. Theka und Analsegment glänzend rotgelb 7.
7. Thorax mit 4 Linien. Schildchen mit 4 Randborsten *Z. pictum* Wied.
 (Hierher wohl *Z. maculiventris* Krb., die mir z. Z. nicht vorliegt.)
 Thorax mit 2 breiten Striemen. Analsegment rotgelb *Z. auroopygium* Krb.
8. Analsegment glänzend rotgelb. Thorax mit 2 schwarzen Längstriemen und einem kleinen Längsstrich dazwischen. Analsegment glänzend schwarz oder rotbraun *Z. analis* Krb.
9. Genitalien rotbraun bis schwarzbraun. Schildchen mit ca. 12 Randborsten. 6. Tergit ohne glänzend goldgelbe Flecke. Genitalien glänzend schwarz 9.
 [anum Krb.]
10. 6. Tergit mit 2 glänzend goldgelben Tomentflecken; 6.5-9.2 mm. *Z. analis* var. *peruviana*
 6. Tergit ohne glänzend goldgelbe Makeln. 9-11 mm. *Z. dibaphus* Krb.
 [Macq.]
Z. obliquefasciatum

Zodion brasiliensis sp. n., ♂, Brasilien, Nova Teutonia.
 Type, Brit. Mus.

Kopf mit der typischen Zeichnung, satt gelbrot. Gesichtsruben schwärzlich, weisslich schimmernd. Stirn und Scheitel schwarz, mit 2 weisslich schimmernden Flecken neben dem Ocellenhöcker. Hinterkopf mit 2 sammetschwarzen Längstriemen, dazwischen ist der Grund heller, gelblichgrün, sonst grüspanfarben. Fühler tiefschwarz, 3. Glied an der Basis mit rotbraunem Fleck, der weiss schimmert. Borsten schwarz. Thorax gelbgrün mit 2 sammetschwarzen Längstriemen, die bis aufs Schildchen reichen, dessen Hinterrand tiefschwarz ist. Zwischen den Striemen sind Spuren von 2 blässeren Linien, ausserhalb liegt eine Fleckenstrieme. Brustseiten schwarz, grauweiss bestäubt. Schildchen mit je 2 schwarzen Borsten im schwarzen Teil. *p* schwarz, weisslich bereift. Vorderhüften mit rötlichem Ton. Hinterleib bläulichweiss schimmernd mit schwarzer, sammetartiger Zeichnung. 2. und 3. Tergit mit grossem,

viereckigem Fleck; 4. mit 2 Dreiecken. Hinterrandsäume schmal, hell; 5. Tergit vorne glänzend schwarz. Analsegment und Theka glänzend schwarz. Flügel grauhyalin, etwas irisierend. 1. Hinterrandzelle schmal offen. Schwinger rotgelb, Schüppchen weisslich.

Zodion abitus Will., 1 ♀ von Brasilien, Nova Teutonia.

Nach der Bestimmungstabelle der nordamerikanischen Arten komme sich auf diese Art, die sonst aus Mass. und Kansas bekannt ist.

Kopfzeichnung wie gewöhnlich. Untergesicht heller gelb, Gruben weisslich. Spitze des 3. Fühlergliedes schwarz gerandet. Thorax grünlich schimmernd. Neben den 2 kurzen schwarzen Mittellinien liegt eine breitere, in 2 Flecken aufgelöste Strieme. Auch Schildchen und Pleuren haben grünlichen Schimmer. Schildchen mit 4 Randborsten. Hinterleib mit demselben grünlichen Schein. Zeichnung tiefschwarz. 2.-4. Tergit mit feiner heller Mittelstrieme, so dass jeweils ein Doppelfleck entsteht, der am 2. viereckig, am 3. und 4. dreieckig ist. *p* rötlichgelb, *f* oben mit grauem Ton. Vorderhüften weisslich schimmernd. Flügel graulich, irisierend. Stiel der 1. Hinterrandzelle kurz, in einem Flügel am Rande geschlossen! Discalzelle mit kleinem Anhang an der abschliessenden Querader (in beiden Flügeln gleichmässig entwickelt).

Z. americanus Wied. hat das 3. Fühlerglied an der Spitze schwarz. *p* eigentlich rotgelb, event. die *f* oberseits grau. 2.-4. Tergit eigentlich sammetschwarz, mit grüspannschimmernden Seiten. Thorax blaugrau mit 2 feinen schwarzen Mittellinien und je einer breiten, in Flecken aufgelösten Seitenstrieme. Schildchen mit 4 Borsten. Argentinien, Mendoza, 5. 1.; 18. 5.; 1. 7. Nova Teutonia, Brasilien; Uruguay, Montevideo, Paraguay, Columbien, Venezuela, Portorico, Mexico, U.S.A. (als *nanellum* Lw. = ? *occidentis* Walk.).

Z. costaricensis Krb. unterscheidet sich von *americanum* durch das ganz ungeflechte grüspanfarbene 1. und 2. Tergit; 3. mit 2 schwarzen Makeln, 4. und 5. mit je 2 schwarzen Dreiecken.

Z. pygmaeum Will. unterscheidet sich von beiden vorstehenden Arten durch das glänzend schwarze Analsegment und Genitalien. (Das von Will. erwähnte ♀

ist sicher *nanellum* Lw.!) Brasilien, Nova Teutonia, sonst bekannt von Cal., Col., La., Mex., Texas, Georg.

Z. griseescens, sp. n., ♂, von N. Argentinien, Salta, iii.–iv. Type, Mus. Berlin. Kopf bleich rotgelb, weisslich tomentiert. Backen am Augenwinkel mit kleinem, schwärzlichen Fleck. Gesichtsgruben schwarz, weiss schillernd, Augenrand bis zum Scheitel silberweiss schillernd; darin liegen braune Makeln. Stirn vom Ozellenhöcker abwärts braun in der Mitte, von der Breite des Ozellenhöckers, eben oberhalb des Fühlerhöckers endend. Vor dem Ozellenhöcker liegt ein gelblicher Fleck. Hinterkopf grau tomentiert, mit der gewöhnlichen Zeichnung. Fühler schwarz; 2. Glied bleichbraun, wie unreif erscheinend; 3. grösstenteils silberschimmernd; 2. ca. um die Hälfte länger als das 3. Thorax braunoliv mit 2 feinen sammet-schwarzen Längslinien, die auf das Schildchen übertreten, dazwischen 2 und ausserhalb jederseits eine hauchfeine bräunliche Linie. Schildchen und Hinterrücken nebst Hüften gelblich graugrün. *p* braun, *f* oben grösstenteils schwärzlich. Klauen bräunlich mit schwarzer Spitze. Haftläppchen gelbbraunlich, weisslich schimmernd. Schüppchen weisslich, Schwinger gelblich. Flügel bräunlichhyalin mit bräunlichen Adern, ziemlich stark. Abdomen grünlichgrau, nur die dicht gedrängten Haarpunkte täuschen eine Zeichnung vor. Analsegment rotgelb, goldig glanzlos tomentiert. Genitalien glänzend rotgelb. Fast 5 mm.

Z. pictum Wied., ♂♀. Bolivien, Mexico, Atoyac. Vera Cruz, iv., Xucumanatlan-Guerrero. Type ♀: Mus. Wien. Type ♂: Mus. Berlin.

♂: 4.5 mm. Gleicht dem ♀ in allem. 3. Fühlerglied an der Innenseite lebhaft rotgelb, nur in einem ♂ schwarz. 2.–5. Tergit mit dreieckigen Flecken, die des 2. am kürzesten, die des 4. getrennt. Genitalien glänzend rostbraun.

Z. triangularis, sp. n., ♂, von Brasilien, Nova Teutonia, 16. 7. Type: Brit. Mus. Unverkennbar durch die Abdominalzeichnung: jedes Tergit trägt nur ein grosses schwarzes Dreieck, das bis zum Seitenrand reicht; auffallend schlank. 5.5 mm. Kopf dunkel rotgelb. Unter- gesicht und Augenrand bis zum Scheitel mit goldgelbem Schimmer. Gruben schwärzlich, gelb schimmernd. Scheitel sammetschwarz mit 2 weisschimmernden Flecken.

Hinterkopf mit 2 schwarzen, senkrechten Binden, dazwischen besonders hell schimmernd, sonst graubraun tomentiert, zart schwarz behaart. Fühler lang, schlank; 2. Glied fast doppelt so lang wie das 3., dieses an der Basis düster rotbraun, sonst gleich den andern tiefschwarz (der Kopf ist angeleimt!). Thorax bräunlich oliv mit 2 klaren, feinen, schwarzen Längslinien, die vor dem Schildchen enden. Zwischen ihnen 2 abgekürzte, schmalere die an der Quernaht enden. Aussen eine breitere Fleckenstrieme. Pleuren graugrünlich. Schüppchen und Schwinger gelblich. Schildchen ganz bräunlich-oliv, Hinterrücken schwarz. *p* schwarz, grau bestäubt. Haftläppchen bräunlich. Flügel graulich, Adern stark, schwarz. Vorderrandzelle an der Basis bräunlich; 1. Hinterrandzelle offen. Abdomen weisslichgrau mit tief-sammetschwarzer Zeichnung. Sie bildet am 2. Ring ein schräges Kreuz, dessen Arme den Seitenrand erreichen. Am 3.–5. Ring bildet sie ein Dreieck mit abgeschnittener Spitze, den Vorderrand erreichend, am Hinterrand breit ausgezogen, die Seiten erreichend. Analsegment graugrün, merkwürdig lang vorgezogen, weshalb die Genitalien weiter basalwärts sitzen als bei andern Arten. Sie sind klein, glänzend schwarz.

Z. punctipennis Krb., ♂♀, von Chile-Conception und Argentinien-Mendoza, 17. 2.–22. 2. ist sofort an der Flügelzeichnung zu erkennen. Type: Mus. München.

Z. dibaphus Krb., ♂♀, von Argentinien-Mendoza, gehört in die Verwandtschaft von *Z. obliquefasciatus* Macq. Das ♂ ist am 2.—letzten Tergit leuchtend rotgelb (bei *obl.* vom 1. Ring ab). Das ♀ hat ein schwarzes Abdomen, grau bestäubt, mit 2 gelblichen, viereckigen Tomentflecken an jedem Ring. 6. Tergit mit 2 fast goldgelben Tomentflecken. Diese sind in einem ♀ von Peru weissgrau. (Var. ?)

Z. aureopictum Krb., ♂ von Costa Rica. Type: Mus. Hamburg. An der Körperzeichnung sofort erkennbar. Thorax sammetschwarz, mit 2 goldgelben, kurzen Längstriemen bis zur Quernaht. 1. und 2. Tergit schwarz mit goldgelben Hinterrandsaum und nach vorn spreizendem Goldstreif am 2. 3. Ring mit gleicher, aber stärker ausgeprägter Zeichnung; 4. goldgelb mit 2 wagerechten, kurzen schwarzen Strichen nebeneinander. 5. mit derselben Zeichnung, aber kaum angedeutet, 6. ganz

goldgelb. Ich vermute, dass *Z. zebrinum* Big. identisch ist sowie auch *Z. auricaudatum* Will., die ich aber beide nur aus der Literatur kenne.

Z. analis Krb., ♂♀, von Chile-Conception, 27. i.-v. Type ♂: Mus. Berlin; ♀ Mus. Hamburg.

Thorax mit 2 breiten, tiefschwarzen Längstriemen bis zum Schildchen und einem kurzen schwarzen Strich dazwischen auf weissgrauem Grund. Hinterleib weissgrau mit je 2 $\pm$ deutlichen schwarzen Dreiecken am 2.-4. Ring, die beim ♂ am 2. Ring minder deutlich sind. 3. Fühlerglied innen und an der Spitze düster rotbraun. Beim ♀ sind Tergit 5 und Analsegment glänzend rotgelb. Kopfbehaarung lang und dicht, schwarz. f_1 -spitzen, namentlich unten, rotgelb. Beim ♂ ist das 5. Tergit gelbrötlich tomentiert, die Genitalien sind glänzend rotbraun.

Nach Malloch sollen *Z. flavocaudatum* Big., ♂ von Chile und *Z. peruvianum* Krb. identisch sein. *flavocaudatum* hat aber nach der Beschreibung 2 breite schwarze Längstriemen bis zum Schildchen und dazwischen 2 feine, braune, kurze Linien. Das Gesicht soll "plus pâle" sein "que le front"; bei *analis* ist es vom selben sattrotgelben Ton wie die Stirn. Die letzten Segmente sollen "entièrement jaunes" sein, bei *analis* sind sie gelblich grauweiss.

Z. analis peruvianum Krb. von Peru, Costa Rica, Mexico-Orizaba hat glänzend schwarze Genitalien, bei 1 ♀ mit rotbräunlichem Ton. Das Toment des Thorax ist durchaus gelbräunlich, nicht weissgrau. Das Schildchen ist wie bei *analis* mit ca. 12 langen schwarzen Seten am Rande besetzt. Die Hinterleibbehaarung ist bedeutend kürzer und schwächer, mehr anliegend. Die Doppelfleckung ist bis zum 4. Ring klar. Die Flecken stossen zusammen und bilden fast 2 kontinuierliche Längsstreifen. Hierher die 2 als Var. von *aureopygium* angeführten ♀, die wohl nicht ausgefärbt sind. (Konowia, vi. p. 137 (1927).)

NEOZODION (Szil.)

hat, von oben gesehen, die Form der *Zodion-americanum*-Gruppe: die Basalpartie des 2. Tergits ist am breitesten, die des 4. am schmalsten. Das 2.-4. Tergit scheinen eine Einheit zu bilden. Die Zeichnung des Kopfes ist die typische *Zodion*-Zeichnung.

MYOPA F.

Die beiden mexicanischen Arten *M. pictipennis* Will. ♂♀ und *M. pulchra* Coqu. sind mir bis heute nicht bekannt geworden. Da *pulchra* vom Autor nur von *fenestrata* Coqu. unterschieden wird, so dürfte, sie mit dieser und *pictipennis* eine Gruppe bilden: Backen lang wollig behaart; Gesicht mit schwarzen Flecken.

OCCEMYIA Rob.-Desv.

Die beiden aus Mexico stammenden Arten *O. loraria* Lw. und *O. abbreviata* Lw. unterscheiden sich hauptsächlich durch die Fühlerbildung:

1. 2. und 3. Fühlerglied gleich lang. 2. Rüsselglied entschieden länger als das 1. Theka kurz und breit. Thorax mit 3 glatten, schwarzen Längslinien *O. loraria* Lw.
2. Fühlerglied stets auffallend länger als das 3. Kleine Art von 5 mm. Thorax grautomentiert, manchmal mit Spuren von 3 schwarzen, glänzenden Striemen *O. abbreviata* Lw.

SICUS Scop.

hat nur einen Vertreter in Mexico: *S. brevirostris* Coqu. ♂♀.

Nach meinem Dafürhalten gehören die folgenden *Conops*-Arten von unbekannter Lokalität in diese Region:

1. *Conops dimidiata* Walk. (ist *Physocephala rufus* Will. var).
2. *Conops maurus* Walk. (ist *Physocephala bimaculata* Krb.).
3. *Conops inhabilis* Walk. (ist *Physocephala bimaculata* Krb. oder *affin.*).
4. *Conops lugubris* Macq. ♂ (ist *Physocephala tibialis* Say).
5. *Conops crudus* Walk. (ist *Physoconops*).

Conops dimidiatus Walk. (1852), Type ♀: London.

Länge 15 mm. Fühler 3·5 mm. Flügellänge 12 mm., -breite 4 mm.

Kopf rotbraun. Backen mit etwas bräunlichgelbem Schiller; Augenrand und unterer Teil der Gesichtsrinnen mit weissem. Rinnen schwarz, Kiel rotbraun. Stirn mit kaum dunklerer T-förmiger Strieme, die in Hufeisenform unten den Fühlerhöcker umfasst. Kopf gross und breit gebaut. Hinterkopf rotbraun, am Augenrand silberglänzen.

1. Fühlerglied rotgelb, ca. $2\frac{1}{2}$ mal so lang wie breit; 2. ca. 4

mal so lang wie das 1., dunkelbraun mit hellen Enden; 3. hell rostrot, oben dunkler, fast halb so lang wie das 2. Griffel 3 gliedrig, rostbraun, der Seitenfortsatz fast halb so lang wie das Endglied. Rüssel dünn, fast 2 mal kopflang, rostbraun mit schwarzer Spitze. Thorax einschliesslich Schildchen und Hinterrücken hell rostrot, mit 3 fast isolierten schwarzen Striemen und einem Fleck vor den Schulterbeulen am Hals. Pleuren mit einem unscharfen schwarzen Fleck oberhalb der Mittelhüften. Thoraxmitte durch feine Bestäubung seidig grau schimmernd. Weisscher Schiller liegt nur unterhalb der Schulterbeulen. Schwinger, p rotgelb. Hüften schwarz, f_{1+2} unterseits mit schwarzbraunem Fleck; f_3 schwarzbraun, mit gelbbraunen Enden. Spitzen der t_3 etwas bräunlich verdunkelt. Tarsen breit, schwarz. Basis der Metatarsen bräunlich. Haftlappchen schwärzlich. Klauen rotbraun, mit schwarzen Spitzen. Flügel bräunlich. Strieme schwarzbraun, die 2. Basal-, Discal- und 1. Hinterrandzelle vollkommen ausfüllend. Vor der Analzelle ein braunschwarzer Saum. 1. Hinterrandzelle wie bei *Conops*. Hinterleib durch Toment graulich, nur das 3. und 4. Tergit tief-schwarz. 1. Tergit und Grenze des 2. + 3. rostbräunlich, 5. und 6. grauschimmernd. Theka klein, schwarz, der Vorderseite etwas rostbräunlich. Genitalien glänzend rostbraun.

Die geringen Unterschiede von *rufus* Will., z. d. Schiller- und Toment-verteilung, erklären sich vielleicht aus dem Alter der Type. Vom ♀ schreibt Will. allerdings, dass die Theka "large" sein soll! Wäre meine Deutung richtig, so ergäbe sich die Synonymie:

Physocephala dimidiata Walk. (*Conops*) ♀ (1852).

syn. *Conops rufus* Will., ♂♀ (1892).

syn. *Physocephala rufithorax* Krb. ♀ (1915).

Conops lugubris Macq. ♂ von p. i. trägt Macq.'s Handschrift, ist als ♀ ausgezeichnet und beschrieben! Das Tier ist klein, 10 mm., und hat recht helle, braune Tarsen; entspricht sonst in allem *Physocephala tibialis* Say, zu der *lugubris* also Synonym wird. Type ♂: London.

Conops inhabilis Walk., ♀, Type: London.

Länge 10 mm. Fühler 2 mm.; Flügellänge 7 mm., -breite fast 2 mm.

Der Kopf ist angeleimt! Augenrand fast ohne Silberschiller. Rüssel fehlt. Fühler bleich rotgelb, incl. Griffel. Am Thorax sind nur die rostbraunen Schulterbeulen silberschimmernd. Schildchenrand rostbraun. f_{1+2} sehr hell. Discalzelle mit grossem hyalinem Spitzenfleck; 1. Hinterrandzelle kaum etwas aufgehellt.

Conops maurus Walk., ♀ Type: London.

Länge 13 mm. Fühler 3 mm. Flügellänge 9.5 mm., -breite 3 mm.

Kopf dunkelgelbbraun. Gruben schwarz, Kiel gelb. Backen schwarz mit gelbem Fleck. Stirn mit sehr zarter T-Strieme. Scheitelblase rotbraun. Untergesicht am Augenrand silberglänzend, desgl. der schwarze Hinterkopf. Rüssel stark, rostrot, mit schwarzen Enden. Fühler dunkel rostrot. Thorax fast ganz schwarz, vorn mit weisslichem Toment. Pleuren schwarzbraun, auch die Hüften. Schwinger rotgelb. Abdomen mit weiss-schillernden Hinterrandsäumen. Theka fast schwarz. Discal- und 1. Hinterrandzelle kaum etwas aufgehellt an der Spitze, Unterrandzelle an der Spitze graulich. Diese geringen Unterschiede beruhen vielleicht auf dem Alter der Type. Zudem ist *bimaculata* Krb. variabel. Wäre meine Deutung richtig, so würde sich folgende Synonymie ergeben:—

Physocephala inhabilis Walk. ♀ (*Conops*) (1849, p. 672).

syn. *Physocephala bimaculata* Krb., ♂♀ (1915).

syn. *maurus* Wlk. ♀ (*Conops*) (1849, p. 673).

Conops crudus Wlk., ♂ ist ein *Physoconops*.

Länge 13.5 mm. Fühler 3 mm.; Flügellänge 8 mm., -breite fast 2 mm.

Sehr schlank gebaut. Stirn und Scheitel schwarz, Stirnmitte gelb aufgehellt. Ozellenhöcker deutlich. Untergesicht ganz gelb, Kiel gelb. Augenrand weiss-schimmernd, mit schwarzer Sammetmakel. 1. Fühlerglied ca. 4 mal so lang wie breit, unten hellrotbraun. 2. ca. 2 mal so lang wie das 1.; 3. fast so lang wie das 2., lang und schlank, braunrot, desgl. der lange 3-gliedrige Griffel. Rüssel ca. 2 mal kopflang, düsterrotbraun. Thorax schwarz, Beulen mit rötlichem Ton, weisslich bereift. Pleuren rotbraun, Schillerstrieme weisslich. Hüften und *p* pechbraun; Vorderhüften, *t*-basen gelblich. Haftläppchen weisslich; Seitenplatten des Hinterrückens weiss bereift. Schwinger

gelblich, Knöpfchen z. T. braun. Schüppchen bräunlich. Flügel glashell, *Conops*-artig. Die schwarzbraune Binde liegt zwischen der 1. und 3. Längsader und *vena spuria*, der Raum darunter absolut hyalin. Discalzelle am Unterrand schmal schwarz bis zur Spitze. Unterrandzelle und 1. Hinterrandzelle an der Spitze graulich aufgehellt. Abdomen sehr dünn gestielt, 2. Ring bedeutend länger als der 3. Die Grenze beider gelbbraun, desgl. die Mitte des 4. Tergits. 3. mit schmaler weisser Hinterrandbinde, 5. und 6. mit ganz feiner Linie, 6. grösstenteils weiss bereift.

Ich vermag die Art mit keiner andern zu identifizieren, möchte sie als amerikanisch ansprechen.

(To be continued.)

XLIV.—*Globicephala leucosagmaphora, a new Species of the Genus Globicephala.* By GEORGE W. RAYNER.

DURING the course of the work of the 'Discovery' Expedition in the Southern Ocean, very many records have been made of a "Blackfish" with white markings on the dorsal surface posterior to the dorsal fin and above the eye. In 1929, the R.R.S. 'William Scoresby' encountered a large school of this dolphin about 40 miles S.S.W. of the Cape of Good Hope, and a lactating female was harpooned and captured. It was obvious that this animal was distinct from all the fully-described species of *Globicephala* in having the dorsal white markings already mentioned. The skeleton has been prepared, but it has not yet been possible by means of osteological characters to distinguish this specimen from *Globicephala melæna*, the species of this genus which it most closely resembles. It is, however, provisionally considered, on the grounds of the distinctive pigmentation and geographical distribution, to be a distinct species not hitherto described, and the name *leucosagmaphora* is suggested.

Globicephala leucosagmaphora is distinguished from all other species of the genus *Globicephala* by the possession in the adult of a saddle-shaped area of whitish pigment on the dorsal surface posterior to the dorsal fin, and a streak of similar pigment, about ten to twelve inches long and one to two inches broad, situated posteriorly to each eye

and running posterodorsally. White pigment occurs on the ventral surface in the same form as that found in *G. melæna*. The young is self-coloured an olive-dun. Its range covers all seas south of about 35° S.

A stranded school of this form is recorded from New Zealand by Oliver (1924)*, who describes the white markings on the dorsal surface; these markings can be seen in the photograph accompanying his description of the stranding.

It is intended to publish a fuller description of this species later.

BIBLIOGRAPHICAL NOTICE.

The World of Insects. By C. D. DUNCAN and G. PICKWELL.
London: MacGraw-Hill Publishing Co., 1939. Pp. 410,
194 figs. Price 21s.

THE number of popular books dealing with insects is already very large, and the appearance of a new one can be justified only if it offers a fresh and original approach to the subject. The book under review fully satisfies these conditions. Its chief distinction from other similar books is that it deals mainly with "insects alive and active" rather than with dead and pinned ones. Anatomical descriptions are restricted to a minimum, but they are exact, concise, and clear. On the other hand, functions of organs and their role in insect life are presented in a most up-to-day manner, and again with remarkable lucidity. An outstanding feature of the book is its illustrations, which are perfect from the technical point of view, always very much to the point and provided with clear explanatory legends. A series of photographs illustrating the metamorphosis of a butterfly (Chapter IV.) is a masterpiece.

Two aspects of insect life have remained overlooked by the authors. One is sense organs and senses, which are scarcely mentioned, and another is ecology, which is touched upon only in Chapter XII. on "Insect Fitness." Apart from these important omissions, the book should rank as one of the best introductory works on entomology, and can be thoroughly recommended to all students as a most stimulating supplement to the textbooks concentrating on morphology and systematics of insects.

* Oliver, W. R. B., 'New Zealand Journal of Science and Technology,' vii. 3, pp. 187-189, 1924.

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[ELEVENTH SERIES.]

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XLV.—*Goniatites from the Caninia Oolite of Gower.* By
T. NEVILLE GEORGE, D.Sc., Ph.D., F.G.S., and EMBRYS J.
HOWELL, M.Sc., F.R.G.S.

GONIATITES are very rare in the Carboniferous Limestone of the South-Western Province. It is therefore the more surprising that they should occur in abundance in the Caninia Oolite, a rock that is usually almost completely unfossiliferous. Their occurrence is restricted to the topmost two or three feet of the Oolite, immediately beneath the lagoon phase deposits characterizing the base of the Upper Avonian. As yet they have been found only at one locality—in the outcrops exposed in the western cliffs of Three Cliffs Bay, Gower (1-inch Geological Survey New Series map 247) (see Dixon & Vaughan, 1911, p. 483): in the cliffs the sequence of strata from the top of the Seminula zone to nearly the base of the Zaphrentis zone is displayed in every detail, and there can be no doubt of the precise age of the beds in terms of Vaughan's zones. On the opposite side of the bay, the Caninia Oolite of the eastern cliffs, only 500 yards away, contains no goniatites, nor do they occur in the numerous exposures farther east. Their absence may be due to the existence of a slight unconformity beneath the Upper Caninia zone, an unconformity that is marked by an abrupt change in lithology, by the

development of pot-holing and obvious erosion of the uppermost bed of the Oolite, and elsewhere in South Wales by marked overstep of the Upper Avonian. On the other hand, there is no considerable break above the Caninia Oolite in south-western Gower; and in Fall, where the basal Upper Avonian lagoon phase is not developed, and where stratal continuity appears to be complete, the goniatites are again absent. It is more likely, therefore, that their restriction to one small exposure is original: it will be recalled that the Upper Avonian goniatites of Gower display a similar irregular distribution in pockets (George & Ponsford, 1935, p. 355), as indeed do most of the molluscs, some of which are very abundant in the Caninia zone.

The goniatites are well preserved and have suffered no crushing or other distortion. They are, however, set in a matrix of oolite grains, a rock that displays few bedding planes but is highly jointed, and one that is notoriously reluctant to yield its fossils. The oolite grains also penetrate the body chambers of the cephalopods, so that the thin shells serve as no more than extremely slender partitions within the rock. It is therefore very difficult to obtain whole specimens, and most break into fragments (set in oolite matrix) on extraction: for this reason, most of the diagrams illustrating this paper are restorations. Moreover, while the original aragonite of the shells has been altered to calcite, there has been no dolomitisation such as occurs in the goniatites from higher horizons in Gower: it has consequently not been possible to dissolve out the shells with dilute acids. The chambers are usually filled with secondary calcite.

The species of goniatites are as follows:—

Muensteroceras cf. *barroisi* (Holzapfel).

Muensteroceras cf. *inconstans* (de Koninck).

Pericyclus *kochi* (Holzapfel).

Cf. *Beyrichoceratoides implicatum* (Phillips).

Cf. *Beyrichoceras obtusum* (Phillips).

Sagittoceras, sp. n.

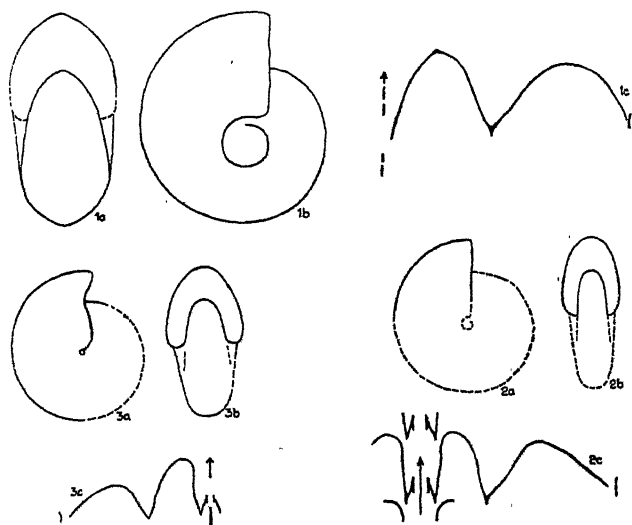
Merocanites cf. *compressus* (Sowerby).

Prolecanites cf. *discoides* Foord & Crick.

With the goniatites occur a number of other cephalopods, including species of *Orthoceras*, *Vestinautilus*, and *Caelo-
nautilus*.

MUENSTEROCERAS Hyatt.

Specimens belonging to different species of Hyatt's genus are the dominant members of the goniatite fauna at Three Cliffs Bay, and occur much more abundantly than any other kinds. Nevertheless, considerable difficulty has been found in allocating names to them, for the various species are inadequately described and there has been no comprehensive review of the mid-Avonian goniatites since de Koninck's day. Moreover, different authors have interpreted established species in different ways. The specific names given are therefore tentative, but they serve to convey the general aspect of the fauna, while representative specimens are described in detail.



Figs. 1 a-c.—*Muensteroceras* cf. *barroisi* (Holzapfel). Figs. 1 a, 1 b, natural size; fig. 1 c, $\times 2$. Caninia Oolite, Three Cliffs Bay, Gower.

Figs. 2 a-3 c.—*Muensteroceras* cf. *inconstans* (de Koninck). Figs. 2 a, 2 b, 3 a, 3 b, natural size; figs. 2 c, 3 c, $\times 2$. Caninia Oolite, Three Cliffs Bay, Gower.

Muensteroceras cf. *barroisi* (Holzapfel). (Figs. 1 a-c.)

A stout specimen with moderately wide umbilicus approaches Holzapfel's species in proportions. The venter, however, is strongly arched, and along the periphery

becomes slightly angular; this characteristic does not appear to occur in the type (Holzapfel, 1889, pl. i. fig. 10), in which the venter is well rounded (compare also Schmidt, 1925, pl. xx. fig. 3).

The suture in the Gower specimen (fig. 1 c) displays a narrow external lobe, but it is not possible to see whether a median saddle is developed. The external saddle, which has an incipiently pointed apex, is deeper but narrower than the first lateral saddle, from which it is separated by an acute and deep first lateral lobe. In general form, particularly in the possession of a small external lobe, the suture approximates to that of the type.

In some respects the Gower specimen is not unlike *Muensteroceras rotella* (de Koninck), which also shows a tendency to develop an acute venter: but its width is disproportionately large.

Comparative dimensions :—

	Gower specimen.	<i>M. barroisi.</i>		<i>M. rotella</i> de Koninck ‡.
		Holzapfel *.	Schmidt †.	
Diameter	28 mm.	48 mm.	27 mm.	44 mm.
Whorl height above umbilical margin.	c. 50 p.c.	49 p.c.	47 p.c.	47 p.c.
Whorl height above preceding whorl.	c. 26 "	30 "	26 "	27 "
Thickness	c. 50 "	48 "	46 "	42 "
Width of umbilicus.	c. 23 "	22 "	23 "	20 "

Muensteroceras cf. *inconstans* (de Koninck).

(Figs. 2 a-c, 3 a-c.)

This species has been interpreted in various ways: de Koninck himself included forms with umbilicus varying in width between 12 and 20 per cent. of the diameter. The Gower specimens now compared with the species are closely involute forms with a small umbilicus. The whorls, which tend to be strongly arched at the periphery, usually have slightly flattened flanks, the greatest thick-

* Holzapfel, 1889, p. 30.

† Schmidt, 1925, pl. xx. fig. 3: approximate proportions.

‡ de Koninck, pl. xlviii. fig. 14.

ness being a short way from the umbilical border. They compare most closely with the form described by de Koninck (1880, pl. xlviii. fig. 6) from Dréhaue, and lack the shoulders that are noticeable on the venter of the specimens from Pauquys (*ibid.*, pl. xlviii. figs. 4, 5) (compare Schmidt, 1925, pl. xx. fig. 6).

The Gower specimens possess sutures (figs. 2 c, 3 c) that are typically muensteroceratid. The external lobe is moderately wide and is divided by a well-developed median saddle. The external saddle is narrow and deep and is markedly asymmetrical; its outer (peripheral) margin is subparallel with the periphery, and displays slight undulations and an inflated apex, while its inner (umbilical) margin is comparatively gently curved. The wide first lateral saddle is relatively shallow and slightly asymmetrical, meeting the umbilical margin obliquely. The first lateral lobe is sharply acute. In these features the forms are very similar to *Muensteroceras pseudaganides* (George & Ponsford, 1935, p. 361), from which they also do not differ greatly in proportions, though they are less discoidal, and increase in diameter more slowly.

Comparative dimensions :—

	Gower specimens.		<i>M. inconstans.</i>	
	Fig. 2.	Fig. 3.	de Koninck *.	Schmidt †.
Diameter	c. 20 mm.	20 mm.	40 mm.	32 mm.
Whorl height above umbilical margin.	c. 50 p.c.	c. 50 p.c.	52 p.c.	49 p.c.
Whorl height above preceding whorl.	c. 20 "	c. 20 "	24 "	24 "
Thickness	c. 37 "	c. 48 "	48 "	50 "
Width of umbilicus.	Small	Small	13 "	16 "

PERICYCLUS Mojsisovics.

Pericyclus kochi (Holzapfel). (Figs. 4 a-e.)

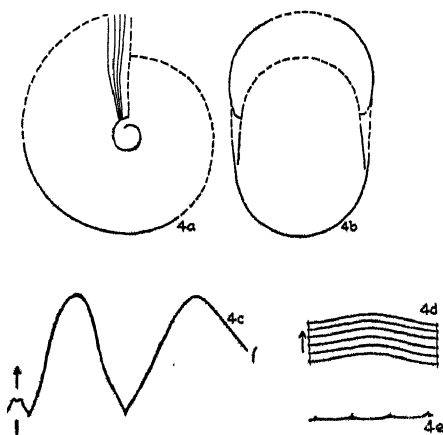
A single specimen appears to be referable in all essentials to Holzapfel's species. It is a stout involute form

* de Koninck, 1880, pl. xlviii. fig. 6.

† Schmidt, 1925, pl. xx. fig. 6.

with a semicircular very depressed whorl. The umbilicus is small and deep, though the whorls do not possess an umbilical slope markedly distinct from the lateral flanks. The periphery is widely rounded, the widest part being ventral to the umbonal margin.

Ornament is well displayed on part of the test. It consists of con crescent costæ that extend across the venter to the umbilical margin. In profile the costæ are angular and are separated by wide rounded furrows (fig. 4 e). Apparently there is little or no increase in number across the venter by intercalation or dichotomy. The costæ are slightly sinuous, being convex forward where they



Figs. 4 a-e.—*Pericyclus kochi* (Holzapfel). Figs. 4 a, 4 b, 4 d, natural size; fig. 4 c, $\times 2$; fig. 4 e, $\times 6$. Caninia Oolite, Three Cliffs Bay, Gower.

cross the venter (fig. 4 d). They are situated about 1.5 mm. apart on the venter at a diameter of 28 mm., there being about 25 in a quarter whorl.

The suture is clearly displayed (fig. 4 c). The external lobe is not very wide and carries a small median saddle with an insignificant median lobe. The external saddle is narrow and deep, its apex sharply rounded, its flanks divergent. The lateral saddle is also deep and its apex sharply rounded. The second lateral lobe lies on or very near the umbilical margin.

Comparative dimensions :—

	Gower specimen.	<i>P. kochi</i> .	
		Holotype *.	Schmidt †.
Diameter	28.5 mm.	35 mm.	32 mm.
Whorl height above umbilical margin.	c. 48 p.c.	48 p.c.	47 p.c.
Whorl height above preceding whorl.	c. 20 „	26 „	27 „
Thickness	67 „	68 „	72 „
Width of umbilicus	c. 26 „	c. 19 „	c. 20 „

It is evident that the Gower form is very near the holotype in shape, dimensions, and ornament, and may without much doubt be placed in the same species. It is very different from the forms (which appear to fall into several species) considered by Böhm (1935, pp. 100, 123) to belong to *Pericyclus kochi*.

Cf. BEYRICHOCERATOIDES Bisat.

Bisat (1924, p. 88) established the genus *Beyrichoceratoides* for the reception of forms which approach very closely in their sutural characters species of *Muensteroceras*, but which he considered to be of later date and (presumably) to be homœomorphous with the earlier (supposedly wholly Tournaisian) group. There is some doubt, therefore, about the correctness of the present reference of the Gower specimens to Bisat's genus, but morphologically some of them bear close comparison with *Beyrichoceratoides implicatum*.

Cf. *Beyrichoceratoides implicatum* (Phillips).
(Figs. 5 a-c.)

The specimens compared with this species are moderately compressed perangustumbilicate forms, strongly involute, with the whorls increasing in diameter at a rapid rate. The venter is strongly arched and well rounded and the flanks slightly flattened. The greatest width occurs near the umbilical margin. In these

* Holzapfel, 1889, p. 35, and pl. iii. figs. 5, 6, 7.

† Schmidt, 1925, pl. xx. fig. 3: approximate proportions.

respects the specimens are not very different from the holotype (see Foord & Crick, 1897, p. 180; Bisat, 1924, pl. ix. fig. 12 a). Their proportions agree generally with forms considered by Bisat (1924, p. 90) to belong to the species.

The suture is muensteroceratid (fig. 5 c), with an external lobe that is perhaps rather wide for *Beyrichoceratoides*, but in which the median saddle is very small. The slightly asymmetrical external saddle is devoid of undulations on its peripheral flank—undulations that are well marked in the forms referred to *Muensteroceras inconstans*. The first lateral lobe is deep and acutely angular, and the first lateral saddle shallow, broad, and slightly asymmetrical.

Comparative dimensions :—

	Gower specimen.	<i>B. implicatum</i> .	
	Fig. 5.	Foord & Crick.	Bisat.
Diameter	26.5 mm.	19 mm.	33 mm.
Whorl height above umbilical margin.	60 p.c.	52 p.c.	59 p.c.
Whorl height above preceding whorl.	39 „	37 „	35 „
Thickness	45 „	52 „	58 „
Width of umbilicus	Small	Small	Small

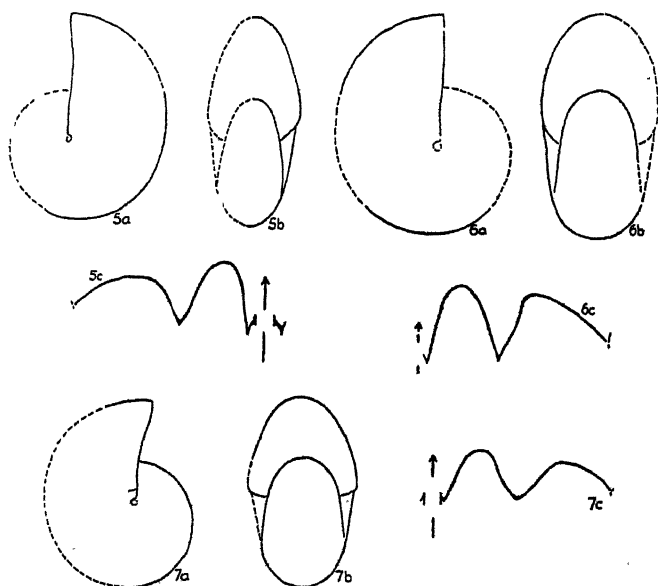
Cf. BEYRICHOCERAS Foord.

Like *Beyrichoceratoides*, *Beyrichoceras* appears to be characteristic of horizons considerably higher than the Caninia Oolite (see Bisat, 1934, p. 282), and some of the Gower forms are compared with one of its species only with considerable hesitation.

Cf. *Beyrichoceras obtusum* (Phillips). (Figs. 6 a-c, 7 a-c.)

Several specimens have the general proportions of Phillips's species. They differ appreciably amongst themselves, however, in details of whorl shape and in sutural characters, and it is probable that they are not all conspecific. They are moderately stout angustum-

bilicate involute forms, showing rapid increase of whorl height with growth. Some of the forms (see fig. 7 *b*) have their greatest width near the umbilical margin, when the flanks are flattened and the venter is strongly arched (though always well rounded). In others the flanks are gently convex, and the greatest width then occurs nearer the periphery (see fig. 6 *b*).



Figs. 5 *a-c*.—Cf. *Beyrichoceratoides implicatum* (Phillips). Figs. 5 *a*, 5 *b*, natural size; fig. 5 *c*, $\times 2$. Caninia Oolite, Three Cliffs Bay, Gower.

Figs. 6 *a-7 c*.—Cf. *Beyrichoceras obtusum* (Phillips). Figs. 6 *a*, 6 *b*, 7 *a*, 7 *b*, natural size; figs. 6 *c*, 7 *c*, $\times 2$. Caninia Oolite, Three Cliffs Bay, Gower.

While the sutures (figs. 6 *c*, 7 *c*) are broadly muensteroceratid, the external lobe is narrow and the median saddle insignificant. The external saddle is simple and nearly symmetrical, and is separated from a markedly asymmetrical moderately deep first lateral saddle by a deep acute first lateral lobe. In these features the sutures approximate to those of typical beyrichoceratids, and differ

from those of such typical muensteroceratids as *Muensteroceras inconstans*. Comparative dimensions :—

	Gower specimens.		<i>B. obtusum</i> .	
	Fig. 6.	Fig. 7.	Foord & Crick *.	Schmidt †.
Diameter	28 mm.	24 mm.	23 mm.	26.5 mm.
Whorl height above umbilical margin.	57 p.c.	51 p.c.	56 p.c.	50 p.c.
Whorl height above preceding whorl.	34 „	31 „	27 „	30 „
Thickness	53 „	58 „	52 „	53 „
Umbilicus	Small	Small	Small	9 „

SAGITTOCERAS Hind.

Sagittoceras, sp. n. (Figs. 8 a-c.)

A fragmentary specimen seems to be referable to Hind's genus.

The shell is compressed becoming oxyconic, involute, with a comparatively small umbilicus (of which the precise proportions are, however, difficult to determine). The ventral flanks are slightly concave in the neighbourhood of the well-marked and characteristic angular carina, the keel thus having a pinched-off appearance. The keel is strongly angular on the last whorl preserved, but is less prominent on the inner whorls, in which the venter may become stout and rounded, when the shell thickness is proportionately greater. The greatest width occurs near the umbilical margin.

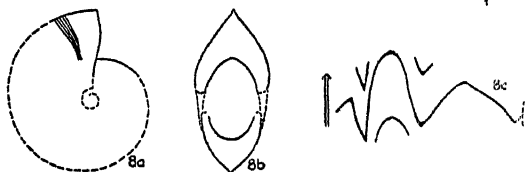
Relics of ornament are present in the form of radially disposed fine striations that extend to the periphery (from the umbilical margin?). They are slightly sigmoidal in shape, having a posterior swing (possibly the hyponomic sinus) where they run to the keel. They are about 1 mm. apart at the periphery, and increase in number from the umbilical margin by dichotomy.

The suture line (fig 8 c) is characteristic. The external lobe is very broad, with a wide median saddle that is divided by a median lobe. The external saddle is rather narrow, deep, and steep-sided, the ventral

* Foord & Crick, 1897, p. 169.

† Schmidt, 1925, pl. xx, fig. 5 (approximate dimensions of '*Muensteroceras ovatum*' Sowerby sp.).

border being sub-parallel to the keel. The lateral lobe is broad. The lateral saddle is widely curved, developing a slight angularity at its peak.



Figs. 8 a-c.—*Sagittoceras*, sp. n. Figs. 8 a, 8 b, natural size; fig. 8 c. $\times 2$. Caninia Oolite, Three Cliffs Bay, Gower.

Comparative dimensions :—

	<i>Sagittoceras</i> , sp. n.	<i>S. acutum</i> Hind.	<i>S. (?) discus</i> .		
			(a) *.	(b) †.	(c) ‡.
Diameter	mm. c. 21.5	mm. ? 63	mm. 33	mm. 33	mm. 31
	p.c.	p.c.	p.c.	p.c.	p.c.
Whorl height above umbilical margin.	c. 47	c. 50	53	53	60
Whorl height above preceding whorl.	c. 30	c. 30	35	31	40
Thickness	c. 44	c. 35	30	28	40
Umbilicus	c. 13	c. 15	12	12	14

There seems little doubt of the Gower specimen being congeneric with *Sagittoceras acutum* Hind—the genotype. Apart from the slight pinching of the margins of the carina, the two forms are closely comparable in shape. The suture of the Gower specimen is, however, not identical with that of *Sagittoceras acutum*, the external saddle being deeper, narrower, and less pointed, while the lateral saddle is proportionately wider: these differences are too insignificant to merit separation of the forms into two genera.

Bisat (1934, p. 297) has considered Hind's species to be synonymous with *Goniatites discus* Roemer, but they differ appreciably in the shape of the venter (in *Goniatites discus* there is no true angular carina, though the shell

* Roemer, 1852, p. 95.

† Schmidt, 1925, pl. xxi. fig. 16.

‡ Bisat, 1934, p. 297.

shape is oxyconic) and in the proportions and shape of the sutural elements (in *Gonatites discus* the external lobe is much narrower than in *Sagittoceras acutum*, the median saddle is narrower with parallel sides, and the lateral saddle is proportionately wide and high). It is doubtful whether the two forms are even congeneric. Certainly the Gower specimen is not closely related to Roemer's species, either as originally described or as interpreted by Bisat.

On the other hand, Schmidt (1925, pl. xxi. fig. 16) has referred to Roemer's species certain German forms with an angular venter and with a suture line very like that of *Sagittoceras acutum*: they seem to be true representatives of Hind's genus, while in proportions they are almost identical with Roemer's type. Their ornament is very similar to that of the Gower specimen. With these may be compared a fragmentary specimen described by Delépine (Delépine & Menchikoff, 1937, p. 82).

The only other described form that appears to be referable to *Sagittoceras* is *Sagittoceras brainardi* (Morgan), of which Miller (1934) has given information concerning morphology and classification. In general form it is similar to the Gower specimen, but is narrower and more oxyconic, and its increase in whorl height is rapid. The details of shape of the sutural elements also differ slightly. Miller has shown that certain other species (such as *Adelphiceras meslerianum* Girty), previously referred to *Sagittoceras*, belong to very different genera: these clearly have no relationship with the Gower specimen. Since the latter thus differs in details of proportion and suture from all described forms of *Sagittoceras*, it belongs to a new species; but it is too fragmentary to be given a new name.

MEROCANITES Schindewolf.

Merocanites cf. *compressus* (Sowerby). (Figs. 9 a-c.)

A single well-preserved specimen has the slender polygyral moderately evolute shape of Sowerby's species. It differs somewhat in the greater degree of inclusion of the whorls, and consequently in the smaller relative width of the umbilicus. The greatest width of the whorl occurs near the centre of the flanks rather than towards the umbilical border (compare Bisat, 1934, p. 305).

The whorl shape in cross-section is thus gently curved and shows no hint of the ventro-lateral shoulders that are characteristic of Sowerby's species. While this may be due to the small size of the specimen, in this respect it is similar to *Merocanites similis* (Crick), though it is much stouter and has a greater proportionate whorl height.

The suture line (fig. 9 c) is clearly displayed. The external lobe is wide and deep. The external and first and second lateral saddles are of much the same size, though the external is the stoutest, and the first lateral the deepest, being slightly constricted. The third lateral lobe is about half the depth of the second. In general outline the suture is appreciably different from those considered by Bisat (1934, p. 288) to be characteristic of *Merocanites applanatus* (Holzapfel) and *Merocanites henslowi* (Sowerby). On the other hand, it is very similar to those of both the latter species illustrated by Schmidt (1925, pl. xix. figs. 14, 15), though the external lobe in the Gower form is appreciably larger.

Comparative dimensions :—

	Gower specimen.	<i>Merocanites compressus.</i>	
		Schmidt *.	Böhm †.
Diameter	28 mm.	40 mm.	18 mm.
Whorl height above umbilical margin.	37 p.c.	35 p.c.	33 p.c.
Whorl height above preceding whorl.	27 „	—	—
Thickness	22 „	19 „	28 „
Umbilicus	40 „	50 „	44 „

PROLECANTES Mojsisovics.

Prolecanites cf. *discoides* Foord & Crick. (Figs. 10 a-c.)

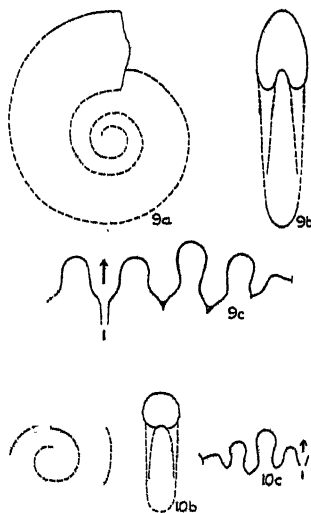
This species, which is readily distinguished from most others by its whorl shape, is represented by a fragmentary specimen. The sub-discoidal evolute latumbilicate form has a nearly circular whorl section, the internal area being only slightly depressed by the preceding whorl. The well-rounded periphery has its greatest diameter at the mid-

* Schmidt, 1925, pl. xix. fig. 14.

† Böhm, 1935, p. 126.

flanks. No ornament can be discerned on the Gower specimen.

The suture line (fig. 10 c) is primitively prolecanitid, the lobes being relatively narrow, deep, and acute. The external lobe is narrow, and the external saddle short. The first lateral saddle is large and prominent, and is the principal element of the suture. The third lateral lobe is shallow, about half the depth of the second lateral. A gently arched third lateral saddle occurs on the flanks and impinges on the umbilical margin.



Figs. 9 a-c.—*Merocanites* cf. *compressus* (Sowerby). Figs. 9 a, 9 b, natural size; fig. 9 c, $\times 2$. Caninia Oolite, Three Cliffs Bay, Gower.

Figs. 10 a-c.—*Prolecanites* cf. *discoides* Foord & Crick. Figs. 10 a, 10 b, natural size; fig. 10 c, $\times 2$. Caninia Oolite, Three Cliffs Bay, Gower.

Despite the difference in size, the specimen may be closely compared with Foord & Crick's type (1897, p. 256), from which it differs (possibly only in virtue of its smaller size) in having a more perfectly rounded whorl shape and less flattened flanks. The sutures of the two forms are also similar, though the elements in that of the type are more regular and approximate more nearly in size. The Gower specimen certainly approaches the type more closely than that described

by Bisat (1934, pp. 288, 306) from Derbyshire, in which the wide sutural lobes are not characteristic of the species. At the same time very close comparison may be made with *Prolecanites clymenizæformis* (de Koninck), and, as Foord & Crick suggested, it is highly probable that the two species are identical.

Comparative dimensions :—

	Gower specimen.	<i>P. discoides</i> . Holotype.	<i>P. clymenizæformis</i> de Koninck *.
Diameter	15.5 mm.	56 mm.	38 mm.
Whorl height above umbilical margin.	c. 31 p.c.	35 p.c.	35 p.c.
Whorl height above preceding whorl.	c. 28 "	c. 33 "	32 "
Thickness	c. 29 "	30 "	30 "
Umbilicus	c. 43 "	40 "	45 "

CORRELATION.

The faunal assemblage described contains elements providing conflicting evidence of age. The muensteroceratids fall into a group that is characteristic of the uppermost Lower Avonian beds : they or their like have been recorded from the Tournaisian in the neighbourhood of Tournai (Tn₃—the equivalent of the upper part of the Lower Caninia zone) (see Delépine, 1930, p. 218) ; they also occur in the zones II β and II γ of the German sequence (see Schmidt, 1925, p. 547). They are consequently in appropriate relationship to the goniatites of the Upper Caninia zone of Gower, which seemingly belong to the zone II δ of the German sequence (see George & Ponsford, 1935). The pericyclid likewise, though typifying a horizon somewhat higher in the series, is not greatly out of place at the top of the Caninia Oolite. Significant absentees are *Muensteroceras complanatum* (de Koninck), *Muensteroceras corpulentum* (Crick), and pericyclids of the type of *Pericyclus fasciculatus* (M'Coy) and *Pericyclus princeps* (de Koninck). *Merocanites compressus* has been recorded from both the upper part of the Tournaisian (II β of Schmidt) and the Lower Dinantian. *Prolecanites discoides*, though considered by Bisat (1934, p. 306)

* de Koninck, 1880, pl. xlix. fig. 13.

to occur at a high horizon in the Upper Avonian, is characteristic of the Upper Tournaisian of the Continent, where, as *Prolecanites clymeniziformis*, it has been recorded from the Calcaire de Vault-les-Tournai (Delépine, 1930, p. 224), and from the zone II β at Zadeltsdorf (Schmidt, 1925, p. 537).

All these forms are thus mutually consistent in confirming the equivalence of the Caninia Oolite of Gower with either II β or II γ of the German sequence.

On the other hand, the forms compared with the beyrichoceratids are seemingly quite out of place. In the north of England, as Bisat (1935, p. 5) has shown, this group is characteristic of the Dibunophyllum zone. The Gower specimens are fragmentary and do not display the ornament, and possess a whorl shape lacking incipient shoulders, so that comparison with the true beyrichoceratids may lead to gross homœomorphous confusion; it may, nevertheless, be remarked that very similar forms have been recorded by Schmidt from II β and II γ , while Turner (1937, p. 200) considered certain beyrichoceratids (described by Foord from Little Island, Cork) to have come from beds with a coral-brachiopod fauna typifying the Upper Caninia zone (C₂). It may well be, therefore, that when phasal conditions were suitable, the beyrichoceratids came in at slightly different times in different places.

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XLVI.—*The Status of the Genus Eurypelma (Order Araneæ, Family Theraphosidæ).* By ALEXANDER PETRUNKEVITCH, Professor of Zoology in Yale University.

AT the time when C. L. Koch proposed the subgenus *Eurypelma*, Arachnology was still in its infancy. In the fifth part of his 'Uebersicht des Arachniden Systems,' published in Nürnberg in 1850, Koch contented himself with the following summary of characters: "Etwas mehr länglicher Vorderleib, mässig grosser Hinterleib, ziemlich gleich dicke Beine; Körper und Hinterleib dicht langpelzig behaart. Die Sammetbürste der Fusssohlen sehr breit" (p. 73). Following this definition of the subgenus 33 species are listed, the first in order being *E. avicularia*, with a reference to Bd. ix. S. 73, F. 337 of his celebrated work 'Die Arachniden.' This species was originally described by Hahn in volume i. of the same work under the name *Mygale avicularia*, on page 101, and pictured in figure 75. From the point of view of modern Arachnology, both the generic and the specific

descriptions are quite inadequate because they are equally applicable to a number of species and genera. But since that species was later synonymized by Ausserer with his *Eurypelma rubropilosum*, and became the type of the genus *Eurypelma* in Simon's treatise, it is advisable to go into greater detail in reviewing the history of the species *avicularia*, and of other species which had been erroneously identified as such.

Although the spider seems to have been known already in the seventeenth century, the name *Aranea avicularia* was given by Linnæus to a species which is now known under the name of *Avicularia avicularia*. Between 1758 and 1805 several authors mentioned the species. Perhaps the best account and figures are those of Johann Heinrich Jördens, who gave also references to 42 papers ('Entomologie und Helminthologie des Menschlichen Körpers,' first volume, 1801, pp. 245-249, plate ix. figures 2 to 9). In 1802 Walckenaer proposed the genus *Mygale*. In 1818 Lamarck established the genus *Avicularia*. In 1820, and again in 1833, Hahn described and figured a spider under the name of *Mygale avicularia*. This species was synonymized by Walckenaer in 1837 with *Mygale bartholomei* Lamarck, and renamed *Mygale nigra*. It was later established that *Mygale bartholomei* Lamarck is not synonymous with either Linnæus's *Aranea avicularia* or Hahn's *Mygale avicularia*, and is at present considered to be the type of *Cyrtopholis bartholomei* (Lamarck). Hahn's figure was drawn from a male in his own collection. It does not show the spur or hook at the end of the first tibia, nor does he mention the presence of a hook in his only too brief description of the specimen on page 101 of the first volume of 'Die Arachniden.' The figure is not very good, but it does not remind one of an *Avicularia avicularia* (L.). Dissatisfied with the description and figure, Koch redescribed the male and for the first time described and figured the female in the ninth volume in 1842. Concerning the male he states:—"Der Mann hat verhältnissmässig etwas dünnere und längere Beine, unten vor der Spitze an den Schienenbeinen des ersten Paares mit einem dicken, hakenförmig einwärts gekrümmten, borstigen Sporn. Die Taster etwas dünner als beim Weibe, das Endglied kurz, dicht, etwas filzartig behaart, und sich vorn etwas theilend; die Genitalien

nicht gross, etwas gewölbt, auswärts etwas ausgehöhlt, mit sehr langem, dünnem, gebogenem Haken." That Koch had a specimen with a single tibial spur is quite certain, because he described several species with two spurs and was unquestionably familiar with that character. That his specimen was either Hahn's original specimen, or even that it belonged to the same species, is far from certain. Koch does not state that it is the same specimen. At the same time his further remarks concerning varieties ("Abarten") of the species seems to me conclusive that he either confused several species or mistook a species living in the ground for an *Avicularia* which, as we know, is more or less arboreal in its habits. At least, he attributes the colour variations of his specimens to the type of soil in which they live. However, we may assume as certain that the two specimens, one a male, the other a female described by Koch in 1842, were the ones which he called *Mygale avicularia* when in 1850 he erected the subgenus *Eurypelma*. In 1864, in the first edition of his 'Histoire Naturelle des Araignées,' Simon still recognized the genus *Mygale* and placed under it, as the second subgenus, *Eurypelma*. In the list of species mentioned under the subgenus, *Eurypelma cancerides* occupies the first place. That species has long since been placed, in agreement with Pocock, in the genus *Phormictopus* as its genotype.

Ausserer published his first revision of Territelariæ in 1871. In that celebrated paper he raised Koch's subgenus *Eurypelma* to the rank of a genus with four subgenera: *Lasiodora*, *Lasiocnemus*, *Homœomma*, and *Eurypelma*. He gave a definition of the genus and of each of the four subgenera, but failed to designate types. Nine species are listed by Ausserer under his subgenus *Eurypelma*, the first two being species newly described by him, the third the *E. rubropilosa* which he considered to be synonymous with Koch's *Mygale avicularia*, but not with Linnæus's *Aranea avicularia*, with which he considered Hahn's *Mygale avicularia* to be synonymous. Ausserer described a female. There is no evidence to show that he examined Koch's specimens. In the introduction he states that he studied the collection of the Vienna Museum, and thanks Dr. L. Koch only for his contribution of European species. The collection of C. L. Koch must have been at that time the property

of Dr. L. Koch, whose heirs later offered it for sale in 1908 or 1909. In his definition of the genus *Eurypelma*, Ausserer gives, on p. 208, as one of the characters the presence of two spurs on the first tibiae of the male. He does not mention that character in his definition of the subgenus *Eurypelma*, but we have to assume that the character of the genus was equally applicable to the subgenus. As a substantiation of this we find two spurs mentioned in the description of all males of *Eurypelma* described by him, namely *E. mordax*, *E. striatipes*, *E. leio-gaster*, and *E. vagans*, *E. steindachneri* and *E. rapax*, described in his second paper in 1875.

In 1892 Simon raised Ausserer's subgenera *Lasiodora*, *Lasiocnemus* (nomen preocc., *Lasiopelma*, nom. nov., Simon), *Homœomma* and *Eurypelma* to the rank of genera. He gave new definitions and assigned to each genus a type-species. To *Eurypelma* he assigned as type-species Ausserer's *E. rubropilosum*, accepting Ausserer's synonymy of that species with Koch's (not Hahn's) *Mygale avicularia*. Under 30, ii. g, of the Rules of Nomenclature "such designation is not subject to change." Unfortunately, Simon's definition of *Eurypelma* was still too broad, and included distinctly not congeneric species. Moreover, his selection of the genotype was still more unfortunate. He accepted Ausserer's synonymy, but apparently did not consult Koch's original description. This oversight did not escape Pocock's scrutiny. In his paper on "Some new and old Genera of S. American Aviculariidae," published in 1901, Pocock called attention to the fact that Koch's description of the male contains the definite statement of the presence of a single tibial spur, "a feature (to quote Pocock) which is characteristic of *Avicularia* or perhaps *Acanthoscurria*, but not of *Eurypelma* as recognized by Ausserer in 1871 and Simon in 1892 . . . In view, then, of the obscurity in which *Eurypelma* is wrapped, I have ignored it altogether in the following pages as a 'genus ignotum,' at all events for the time being." In the second volume of the 'Histoire Naturelle des Araignées,' published in 1903, Simon recognized the validity of some of Pocock's genera, but still retained the genus *Eurypelma* and treated Pocock's "*Pterinopelma*, *Aphonopelma* et (?) *Plesiopelma*" as synonyms of *Eurypelma*. However, he still considered

Ausserer's *E. rubropilosum* to be synonymous with Koch's *E. avicularia*, although he adds: "je dois dire cependant que je n'ai aucune certitude quant à la détermination de l'espèce (commune dans les Guyanes et le nord du Brésil) que je regarde comme *E. rubropilosum* Ausserer."

In 1923, in his monumental work 'Theraphosoideas do Brasil,' Mello-Leitao accepted Pocock's classification and genera, dropped the genus *Eurypelma*, and at the same time gave a description of a species which is common in the North of Brazil and which agrees with the description of *E. rubropilosum* Ausserer. However, he was not absolutely certain that his specimens were identical with either Ausserer's species, or with the species described by Simon as *E. rubropilosum*. Mello-Leitao placed his specimens in the genus *Pterinopelma*. He also gave a key to Pocock's genera, but unfortunately the key contains some errors.

In considering the status of the genus *Eurypelma* we are now confronted with several peculiar and important facts:—(1) Ausserer's *E. rubropilosum* is not Koch's *E. avicularia*; (2) it is impossible to determine the generic characters of Koch's *E. avicularia* unless the original specimen were re-examined; (3) assuming that the original specimen is still in existence and could be re-described, Koch's genus *Eurypelma* would have to have it for genotype and would automatically exclude all species described since Ausserer's time under *Eurypelma*; (4) under the Rules of Nomenclature, no other species than Koch's *E. avicularia* may be assigned as genotype of *Eurypelma*; (5) until the original specimen of Koch's *E. avicularia* has been re-described in accordance with modern ideas of valid generic characterization, the genus *Eurypelma* must remain a genus *incertum* and *invalidum*; (6) Pocock's genera must be used as the only valid ones; (7) all species described under *Eurypelma* must be placed either in one or another of Pocock's genera; or else, if their characters do not permit it, in a new genus with a properly chosen genotype; (8) species inadequately described must remain for the present *incertæ sedis*.

Following this line of thought necessitated by the facts, I have re-examined several species from specimens in my collection and placed them in their proper genera. I have,

furthermore, placed several American species in their proper genera by careful selection of characters given in the original descriptions. For several species which cannot be placed in any valid genus I propose the new genus *Delopelma*, with *D. (Eurypelma) marxi* (Simon) as genotype. This species is well known to me and cannot be confused with any other species. All these species are listed in their proper genera in the first part of my 'Catalogue of American Spiders,' published by the Connecticut Academy. It is unfortunate that many species have been so poorly described by their authors that they cannot be assigned to any genus in the subfamily to which they belong.

The following key does not include several genera listed in my 'Systema Araneorum' under the subfamily Grammostolinæ. Of these genera, *Sphærobothria* Karsch has been removed by me to the subfamily Ischnocolinæ, after examination of specimens in the Harvard Museum; the genera *Davus* Cambridge, *Eruathlus* Ausserer, *Lasiopelma* Simon (= *Lasiocnemus* Ausserer, *nomen pre-occupatum*) and *Mygalarachne* Ausserer, are insufficiently described even for safe inclusion in the subfamily; the genus *Eurypelma* Koch (Ausserer, Simon) remains *incertæ sedis* for reasons explained above.

Key to the Genera of the Subfamily Grammostolinæ.

- | | | |
|--|-----|---------------------------|
| 1. A true lyra present, with two rows of vibrating chords on the coxa of the first leg and catching pins on the coxa of the pedipalp | 2. | |
| *A true lyra wanting | 7. | |
| 2. No auxiliary stridulating apparatus on the trochanter of palp and first leg. Sternum normal | | <i>Grammostola</i> Simon. |
| *An auxiliary stridulating apparatus on the trochanter of palp and first leg. Sternum strongly narrowed in front and convex.. | | <i>Sorata</i> Strand. |
| 3. Coxa and trochanter of palp and first leg clothed with simple or plumose hair and bristles | 4. | |
| *Short spines or spines ending in bristles present on either coxa or trochanter of palp and first leg | 10. | |
| 4. Lip with few scattered granules | 5. | |
| *Lip with numerous granules | 6. | |
| 5. Metatarsus of first leg shorter than tibia, scopulate to base. The two spurs of the first tibia of male subcontiguous, blunt.. | | <i>Paraphysa</i> Simon. |
| *Metatarsus of first leg at least as long as or longer than tibia, scopulate only in distal | | |

- half. The inferior spur of the first tibia of male much longer, curved..... *Phryxotrichus* Simon.
6. First tarsus scopulate only in distal two-thirds. Posterior median eyes much smaller than anterior median eyes and far removed from the latter *Rhecostica* Simon.
- *First tarsus scopulate to base 7.
7. Plumose hair present on trochanter of palp and of first leg 8.
- *Plumose hair wanting on trochanter of palp and of first leg 9.
8. Plumose hair present on the inner surface of the femur of the first leg *Brachypelma* Simon.
- *Plumose hair wanting on the inner surface of the femur of the first leg *Pterinopelma* Pocock.
9. Coxa of first leg clothed in front with simple slender bristles intermixed with erect pin-like hairs, trochanter with slender ragged bristles. Metatarsus of first leg of male passes between the two tibial spurs. *Plesiopelma* Pocock.
- *Coxa of first leg as well as trochanter clothed with simple, recumbent hair. Metatarsus of first leg of male passes outside of both tibial spurs *Delopelma*, nov.
10. Short spines or spines ending in a bristle are present on the posterior surface of the coxa of the palp and the anterior surface of the coxa of the first leg 11.
- *Short spines and spines ending in a bristle are present only on the anterior surface of the coxa of the first leg, but not on the posterior surface of the coxa of the palp. *Aphonopelma* Pocock.
11. Stout plumose stridulating bristles present on the posterior surface of the trochanter of the palp and on the anterior surface of the trochanter of the first leg *Citharacanthus* Pocock.
- *Not so 12.
12. Trochanter of palp with spines ending in a fine bristle. Fourth metatarsus without scopula. *Eurypelmella* Strand.
- *Trochanter of palp clothed only with simple hair and delicately plumose bristles. Fourth metatarsus scopulate in distal third *Dugesiella* Pocock.

Genus DELOPELMA, nov.

Closely related to *Pterinopelma* and *Brachypelma*, from which it differs by the complete absence of plumose hair. All tarsi scopulate to base, the scopulae not divided longitudinally by bristles. First and second metatarsi scopulate to base, third in distal half, fourth in distal third. All coxae and trochanters clothed with simple hair and simple bristles. True lyra wanting. Short spines and spines ending in a bristle, characteristic of

several other genera, also completely wanting. Lip with numerous granules at tip, maxillæ with numerous granules near base. Eyes on a joint-tubercle. The two tibial spurs of the male unequal in length, the metatarsus when flexed passes on the outside of both spurs.

Type, *D. marxi* (Simon).

XLVII.—*On Acanthephyra purpurea and its Allies (Crustacea Decapoda: Hoplophoridae)*. By STANLEY KEMP, Sc.D., F.R.S.

ONE of the most striking features of collections made with large plankton nets in the open ocean is the great number of prawns of a vivid scarlet or blood-red colour which are obtained. They include both Penæidea, represented by such genera as *Sergestes* and *Gennadas*, and Caridea with Hoplophoridae as the dominant family. The Hoplophoridae appear to be exclusively pelagic in habitat; though scarce in high latitudes they occur in all the oceans of the world, and in temperate and tropical waters they are frequently abundant.

There are many species of Hoplophoridae which are extremely scarce and are known only from few specimens, often obtained at widely distant localities; but, with a few exceptions to be noted below, the abundant species in every part of the world belong either to *Acanthephyra purpurea* A. Milne-Edwards or to a form which bears a very close resemblance to it. In any large collection of oceanic Caridea more than 80 per cent. of the material will belong to the *A. purpurea* group.

In 1906, when attempting the identification of certain Hoplophoridae from the west coast of Ireland, I went somewhat fully into the characters by which the various forms related to *A. purpurea* were supposed to be distinguished. In so doing I examined the 'Challenger' specimens, pointed out numerous discrepancies in Spence Bate's account, and gave a partial revision of the genus. So far as *A. purpurea* and its allies were concerned, I convinced myself that only a single highly variable species could be maintained. This opinion has not remained unchallenged in the years that have intervened: it has

been effectively contested by Stephensen (1923) and is not accepted by Balss (1925).

The ships of the Discovery Committee, on the numerous voyages which they have made to the Antarctic during the past fourteen years, have taken every opportunity to explore the pelagic fauna of the South Atlantic, and large plankton nets have also been used in all sectors of the Antarctic and on the East African coast. The extensive Decapod collections made in this way have been placed at my disposal by the Committee, and I have also had the opportunity of examining the still more abundant Hoplophorid material obtained by the late Dr. Johannes Schmidt during his celebrated voyage round the world in the 'Dana.' I am greatly indebted to Dr. Å. Vedel Tåning and the authorities of the Carlsberg Foundation for the privilege of reporting on this unrivalled collection. A full account of the Hoplophoridæ from these sources will, it is hoped, be published before long; but in the meantime, for the assistance of others engaged in similar work, it appears desirable not only to recant my former views, but to put on record the conclusions which have been reached regarding *A. purpurea* and its allies after examining the largest collection hitherto made.

There is perhaps something to be said in extenuation of the opinion I formerly held. In *A. purpurea* and its relatives the rostrum, its length and the characters of its dentition, is of minor taxonomic importance, and apart from details concerned with the presence or absence of a tooth on certain abdominal somites, the only obvious differential character is the number of dorso-lateral spines on the telson—a feature which at first sight would not appear to be of special significance. In the group the number of pairs of these spines varies from 3 to 19*, and since, with sufficient specimens, practically every intermediate number may be found, it was perhaps pardonable to believe that the character had no real validity. It is now apparent, however, that the number of telson spines is very definitely correlated with geographical distribution, and the study of several thousand specimens from all parts of the world leads me to the

* In reckoning the number of spines, those which form the terminal cluster at the tip of the telson are omitted.

conclusion that eight distinct forms should be recognized in the *A. purpurea* group.

The facts which have emerged may be briefly stated thus :—

In the North Atlantic, as Stephensen (1923) has already shown, two forms only are represented ; one of these has 4 pairs of spines on the telson, while the other, which reaches a larger size, has from 7 to 11. The 4-spined form is *A. purpurea* A. Milne-Edwards, and in adults the dorsal carina of the fourth abdominal somite terminates bluntly and does not end in a tooth. The northern limits of this species are not easily ascertained owing to confusion with the allied form, but probably do not extend much beyond 53° N. ; its southern limit on the eastern side of the Atlantic is in about 17° N.

The form with 7 to 11 telson spines has a tooth at the end of the carina on the fourth abdominal somite. It is known to occur as far north as Davis Strait, S.W. Greenland and Iceland. There are indications that it lives generally at lower levels than *A. purpurea*, and it is probably able to reach higher latitudes by taking advantage of the warm intermediate layer of water. It is the only member of the *purpurea* group which penetrates into the Mediterranean, and here, as Stephensen has noted, there is a difference in the growth of the rostrum, which in adults is proportionately longer than in Atlantic specimens. The southern limit of this form on the eastern side of the Atlantic is in about 13° N. This species has frequently been referred to as *A. multispina*, but its correct name appears to be *A. hæckeli* (von Martens). Von Martens (1868) described it from the Mediterranean as *Ephyra hæckeli*, and I have examined the types in the Berlin Museum.

Passing down the Atlantic from north to south a sudden change occurs in the species of the *purpurea* group at the limits noted above. In place of a 4-spined form one with 6 (less commonly 5) telson spines now appears and, in place of the 7- to 11-spined, one with 13 to 19. The form with 6 spines has not been described hitherto, and I propose for it the name *A. sexspinosæ*. Apart from the telson, adults of this species differ from all other members of the group in the absence of teeth at the posterior ends of the carinæ of both fourth and fifth

abdominal somites. *A. sexspinoso* reaches its southern limit in the neighbourhood of 18° S.

The form with 13 to 19 spines is Spence Bate's *A. acanthitelsonis*, described from the 'Challenger' collections. It appears to live in rather deeper water than *A. sexspinoso* and its southern limit is about 28° S. The collections examined indicate that these two species, *A. sexspinoso* and *A. acanthitelsonis*, occur only in the Central and South Atlantic, and occupy this area to the complete exclusion of all other members of the group.

Continuing southwards there is once again an abrupt change in the species. At 35° S. *A. sexspinoso* has given place to a form with 4 telson spines, and at 24° S. *A. acanthitelsonis* begins to be replaced by one with 7 to 11 spines: we have, strangely enough, returned to species closely similar to those in the North Atlantic. The 4-spined form can, however, be distinguished from its northern counterpart, for the dorsal carina of the 4th abdominal somite invariably ends in a tooth. The only name available for this form, *A. batei* Stebbing, is preoccupied in the genus, and I propose therefore to call it *A. quadrispinosa*. The form with 7 to 11 telson spines does not appear to differ from *A. haeckeli* in any feature of importance, and in the proportionate length of the adult rostrum it is intermediate between Mediterranean and North Atlantic specimens. In the absence of distinctive characters the same name, *A. haeckeli*, should be used for both northern and southern forms, the species thus having a widely discontinuous distribution. In the Atlantic sector of the southern ocean *A. quadrispinosa* extends nearly to 40° S., while *A. haeckeli*, living at greater depths and, as in the north, taking advantage of the warm intermediate layer of water, is able to reach 55° S.

Balss (1925, pp. 254-5) has recorded specimens from twenty-four stations in the Atlantic under the names *A. purpurea* and *A. acanthitelsonis*, and from the particulars he gives of the numbers of telson spines it is clear that his material is in good agreement with the statements made above: unfortunately, he does not give details of the teeth on the abdominal somites. He had 4-spined and 8-9-spined forms both in the north and south, with *A. acanthitelsonis* and a form with 5 or 6 spines in the intervening latitudes. The only discrepancy

is an 8-spined specimen from 4° S., which may perhaps be an abnormal *A. sexspinosa*.

Turning now to other parts of the world, the first point to be noted is that *A. haeckeli* and *A. acanthitelsonis*, with 7 or more telson spines, have no representative in the equatorial or northern waters of the Indian and Pacific Oceans. In southern latitudes *A. haeckeli* evidently has a circumpolar distribution. It was taken by the 'Dana' only at her southernmost stations in the New Zealand area, and it has been found by the 'Discovery II' to the west and south-west of Kerguelen and in the Bellingshausen Sea, south-west of Cape Horn. In the Indo-Pacific it does not extend so far north as in the Atlantic, not reaching north of 32° S. Its southern limit, so far as is known, is 57° S.

A. quadrispinosa has a wide Indo-Pacific distribution, which, in sharp contrast with that in the Atlantic, extends far north of the Equator. Its latitudinal limits are from 25° N. to 42° S., and it ranges from the East African coast to mid-Pacific in 163° W. The species has been recorded from the Indo-Pacific under the name of *A. purpurea* by various authors: by de Man (1920), (Balss 1925), Calman (1939), and others.

In the warmer parts of its Indo-Pacific range *A. quadrispinosa* is associated with two other members of the *purpurea* group. One of these, also with 4 spines on the telson, is an abundant form long recognized as distinct under the name of *A. sanguinea* Wood-Mason. This species is easily separated by the structure of the branchio-stegal spine of the carapace, which exists merely as a small projection of the frontal margin and is not flared outwards and flanked by a short carina as it is in *A. quadrispinosa*. *A. sanguinea* extends from the Gulf of Aden (Calman) to the East Indian Archipelago in 138° E. Its southern limit is in 12° S. and in the east it reaches 18° N.

The other species associated with *A. quadrispinosa* is a large heavily-built form not hitherto recognized. In its proportions it differs widely from other members of the group; the carapace and abdomen are conspicuously deeper in proportion to their length, and the abdomen is relatively shorter than in any of the others, the length excluding the telson being less than twice as long as the

carapace. It has, constantly, only 3 pairs of spines on the telson. I propose for this species the name *A. smithi*, in recognition of the American carcinologist Sidney I. Smith, who was far in advance of any of his contemporaries in the accuracy of his work on deep-water Crustacea. *A. smithi* has a range extending from the East African coast to mid-Pacific (131° W.) and in the east it occurs from 20° N. to 24° S.

Only one other form remains to be mentioned. It occurs on the west coast of Central and South America and was recorded by Faxon as *Acantheephyra agassizi*? (a name which is synonymous with *A. purpurea*). This form appears to be closely related to *A. sanguinea*, for it has the same reduced branchiostegal spine and in the peculiar pitting of the carapace resembles this species and differs from all other members of the group. The rostrum, however, is very much shorter and, like *A. smithi*, it has only three pairs of spines on the telson. To this species, or variety, I give the name *trispinosa*. I have seen fewer specimens of it than of any of the others, and the rather meagre records indicate that it is found off the West Coast of America from 7° N. (Faxon) to 4° S. Specimens obtained by the 'Dana' show that it extends westwards into the Pacific as far as 116° W.

A point that will be noticed in this review is that certain oceanic regions, such as the North Pacific and that lying off the western coast of South America, are apparently not inhabited by any members of this otherwise universally distributed group of species. The deep-water pelagic fauna of the Pacific coasts of S. America no doubt needs further exploration, but so far as the North-west coast of America is concerned it seems that the deficiency is a real one. No representatives of the *A. purpurea* group were taken by the Harriman Alaska Expedition, and Mr. Fenner A. Chace of the Harvard Museum, to whom I am indebted for much information on the Hoplophoridae, tells me that he knows of no records from this area.

A question which naturally arises is the amount of variation in the number of telson spines and the extent to which the character is reliable. In the telson, though to a lesser degree than in the rostrum, abnormalities sometimes occur, and these appear generally to be due

to injury. A moult succeeding the injury may result in a telson more or less normal in form, but either by its reduced length or from other evidence abnormalities can usually be detected. As to normal variation, it is comparatively common to find some irregularity in the disposition of the spines on the two sides of the telson; but with the lower numbers, 3 and 4, any deviation from the specific number occurs, on one side only, in a very small percentage of specimens, while it is exceedingly rare (though not unknown) for a 3-spined species to possess 4 pairs of spines or *vice versa*. In *A. sexspinos*^a 5 spines are not uncommon on one side only, and throughout the area of its distribution 5 pairs are occasionally found. In *A. hæckeli* and *A. acanthitelsonis* there is naturally a range of numbers rather than a fixed number. The observed limits are 7 to 11 in the former* and 13 to 19 in the latter. Stephensen records a specimen of *A. multispina* (= *A. hæckeli*) with 13 pairs—presumably an abnormality. Specimens with 12 spines are extremely scarce: I have not seen any myself.

The species of *Acanthephyra* discussed in this paper may be distinguished from other representatives of the genus by the following characters †:—

Carapace without a dorsal carina in posterior half; laterally not carinate or with a short branchiostegal carina not nearly reaching to hepatic groove. Rostrum well formed, reaching almost to or beyond end of antennal scale, with teeth along whole length of upper margin and with three or more teeth below. Cornea wider than eyestalk. Abdomen dorsally carinate on second to sixth somites; carinae of at least third and sixth somites ending in teeth. Telson dorsally sulcate at proximal end, with three or more pairs of dorso-lateral spines, excluding those at apex.

The eight forms in the group may be diagnosed thus:—

Acanthephyra acanthitelsonis Spence Bate, 1888.

Branchiostegal spine of carapace strong, flared outwards and supported by a sharp carina extending back-

* Stephensen notes that six spines are sometimes found in Mediterranean specimens.

† In Chace's recent key to *Acanthephyra* (1936) the species fall under section 11.

wards on to carapace for fully three times length of spine. Surface of carapace very finely and evenly pitted. Dorsal carinæ of third to sixth abdominal somites ending posteriorly in a tooth; that of third somite longer than any other. Telson with 13 to 19 pairs of dorso-lateral spines*. Form slender; dorsal length of sixth somite, without spine, twice or rather more than twice its depth at posterior end. Rostrum in adults usually not reaching to end of antennal scale and shorter than carapace†. Length ‡ up to 134 mm.

Central and South Atlantic, from about 14° N. to 28° S.

Acanthephyra hæckeli (von Martens), 1868.

Resembling *A. acanthitelsonis* in most characters, but with 7 to 11 pairs of dorso-lateral spines on telson. Rostrum in adults sometimes extending beyond antennal scale and longer than carapace. Length up to 147 mm.

Distribution discontinuous. N. Atlantic from Davis Strait and Iceland to about 13° N. Mediterranean. S. Atlantic from 24° S. southwards. Circumpolar in southern latitudes, extending north to 32° S. Length up to 134 mm.

Synonyms: *A. sica* Spence Bate, *A. rectirostris* Riggio, *A. parva multidentis* Coutière, *A. multispina* Coutière (Sund).

Acanthephyra sexspinosa, sp. n.

Branchiostegal spine of carapace strong, directed somewhat outwards; not buttressed by a definite carina but forming the termination of a short, smoothly rounded swelling. Surface of carapace finely and uniformly pitted. Dorsal carinæ of both fourth and fifth abdominal somites, in adults, not ending posteriorly in a tooth; dorsal tooth of third somite long, much exceeding that on sixth somite. Form slender, dorsal length of sixth somite, without spine, about twice its posterior depth. Rostrum in adults extending beyond antennal scale, but usually shorter than carapace. Length up to 96 mm.

Central and South Atlantic from 17° N. to 18° S.

* Excluding those which form the terminal cluster at the apex of the telson.

† Measured from the back of the orbit to the mid-dorsal point of the posterior margin.

‡ From tip of rostrum to tip of telson.

Acanthephyra purpurea A. Milne-Edwards, 1881.

Branchiostegal spine of carapace strong, flared outwards and supported by a conspicuous carina extending backwards on to carapace for fully twice length of spine. Surface of carapace coarsely and uniformly pitted. Dorsal carina of fourth abdominal somite, in adults, not ending posteriorly in a tooth; tooth of third somite much longer than that of fifth or sixth somites. Telson with 4 pairs of dorso-lateral spines. Form slender, dorsal length of sixth somite, without spine, more than twice its depth at posterior end. Rostrum in adults extending much beyond antennal scale and longer than carapace. Length up to 105 mm.

North Atlantic to the north of 20° N.

Synonyms: *Miersia Agassizi* Smith, *Acanthephyra parva paucidens* Coutière.

Acanthephyra quadrispinosa, sp. n.

Resembling *A. purpurea* in all the characters noted above except for the constant presence of a tooth at the distal end of the dorsal carina of the fourth abdominal somite; this tooth is a little smaller than that on the fifth somite. The pitting on the carapace is uniform but is finer than in *A. purpurea*. Length up to 111 mm.

South Atlantic from 32° S. to 40° S. Indo-Pacific from the E. African coast to 163° W., and from 25° N. to 42° S.

Synonym: *A. batei* Stebbing (*nec* Faxon).

Acanthephyra sanguinea Wood-Mason, 1892.

Branchiostegal spine extremely small, in large specimens sometimes obsolete, forming merely a small projection on frontal border of the carapace and not supported by a carina or swelling. Surface of carapace finely pitted; pits aggregated so as to form narrow, slightly curved bands, disposed vertically and with smooth interspaces between*. Dorsal carinae of third, fourth, fifth, and sixth somites ending in a tooth; that

* The pits, in all species of the *purpurea* group, form the points of attachment of small lanceolate scales which overlap each other, with the tips directed forwards. In preserved specimens of most species these scales are usually rubbed off, but in *A. sanguinea* they are more persistent and patches of scales, forming a thick tomentum, are frequently seen.

of third somite the largest and of fourth the smallest. Telson with four pairs of dorso-lateral spines. Form moderately slender; dorsal length of sixth somite, without spine, usually twice or nearly twice its posterior depth, one and two-thirds times in very large specimens. Rostrum long, in adults extending beyond antennal scale and exceeding length of carapace. Length up to 126 mm.

Indo-Pacific from the Gulf of Aden and East African coast to 138° E., and from 18° N. to 12° S.

Synonym: *A. kempfi* Balss, which is based on a specimen with a malformed rostrum.

Acanthephyra trispinosa, sp. n.

Closely related to *A. sanguinea*, with which it agrees in the disposition of the pits on the surface of the carapace. Branchiostegal spine very small, on frontal margin, with only the barest indication of a swelling at its base. Dorsal carinæ of third to sixth abdominal somites ending in a tooth; that of third somite much the largest, that of fourth scarcely smaller than that on fifth. Telson with three pairs of dorso-lateral spines. Form moderately slender, dorsal length of sixth somite, excluding spine, about twice its posterior depth. Rostrum in adults extending to or slightly beyond end of antennal scale, but always shorter than carapace. Length up to 86 mm.

West coast of Central America from 7° N. to 4° S., extending westwards to 116° W.

Acanthephyra smithi, sp. n.

Branchiostegal spine of carapace not strong, scarcely directed outwards; not buttressed by a definite carina but forming the termination of a short smoothly rounded swelling. Surface of carapace very finely and uniformly pitted. Dorsal carina of second to sixth abdominal somites exceptionally high; carinæ of third to sixth somites ending in large teeth, that of third little if at all larger than the others. Telson with three pairs of dorso-lateral spines. Form unusually stout; abdomen short, its length, excluding telson, less than (in large specimens much less than) twice length of carapace*; dorsal length

* In all the other species of the group the abdomen is more than twice as long as the carapace.

of sixth abdominal somite not more than one and a half times its posterior depth. Rostrum, in adults, not extending beyond end of antennal scale and always shorter than carapace. Length up to 127 mm.

Indo-Pacific from the East African coast to mid-Pacific in 131° W. At the western end of its range it extends to 14° S. and at the eastern end from 20° N. to 24° S.

In this paper I have called all the forms species, though it must be admitted that the characters which differentiate them are for the most part of minor importance when compared with those which serve to separate other members of the genus. Some may prefer to regard *A. quadrispinosa* as a subspecies of *A. purpurea*, and *A. trispinosa* as a subspecies of *A. sanguinea*. But though the distinctions between these pairs of forms are confined to a single character, except for an occasional freak specimen they are absolute, and the component forms in each pair are geographically isolated from each other. *A. acanthitelsonis*, with perhaps more reason, might be considered a subspecies of *A. hæckeli*, and the distribution of the former abuts on that of the latter in the North Atlantic and overlaps it by some 4° in the South Atlantic, but here again the character, so far as is known, is absolute, and there is no intergradation between the two forms at their points of contact.

I have found it particularly difficult to reach any feeling of certainty about *A. hæckeli*, here regarded as a single form with a discontinuous distribution in the North Atlantic and Mediterranean and in southern latitudes. Caridea are animals with such a large number of parts that it is not easy to convince oneself of the identity of specimens from different regions. I have failed to find any valid differential characters between the two groups, but it is quite possible that such characters exist and will ultimately be discovered.

The distributional facts brought to light in this group of species appear to me to be noteworthy. Marine animals show a fixity of specific characters not usually seen in land faunas, and this is generally attributed to the uniformity of their environment and the lack of

barriers to a wide dispersal. And of all marine environments the open ocean is commonly regarded as presenting the most uniform conditions. In consequence, it was by no means unexpected to find, as we do both in the Hoplophoridae and in many other groups of pelagic oceanic animals, that a single species might be found at a number of widely distant localities without exhibiting the slightest deviation from a set pattern of structural characters. It is thus not a little astonishing to find that these abundant pelagic Caridea have become differentiated in the various oceans.

Improved hydrographic knowledge will perhaps reveal environmental differences in the oceans which will throw light on the distribution of *A. purpurea* and its allies, and eventually, by this means, it may be possible to explain how such species as *A. sexspinosa* and *A. acanthitelsonis* are able to occupy a well-defined area in the Atlantic without being dispersed by ocean currents into regions inhabited by other forms.

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XLVIII.—*The Lucanid Coleoptera of the Caroline Islands.*

By GILBERT J. ARROW, British Museum (Natural History).

[Plate XIV.]

I RECENTLY published (Ent. Month. Mag. vol. lxxv. 1939, p. 84) an enumeration of the Lamellicorn Coleoptera collected in the Caroline Islands for the Bishop Museum, Honolulu, consisting of three species of Lucanidae and five species belonging to other families. Of the Lucanidae,

one (*Ægus alternatus* Fairm.) has been known since 1881, one (*Dorcus carolinensis*) was described by me as new, and the third, of which only a single pair has been found, was left unnamed for want of a more adequate representation. Upon maturer consideration it has appeared to me that, since a better opportunity of dealing comprehensively with these three rather similar species may not occur for a very long time, it is desirable, while the present series remains unbroken, to figure side by side the two sexes of each. I have therefore named and described the third species in this paper.

Since the Lucanidæ only form a very small part of the immense Lamellicorn suborder, the three known species of the Caroline Island fauna form a rather surprising proportion of the present collection, the five other families being each represented by only a single species. In dealing with the Lamellicorn fauna of the Samoan Islands ('Insects of Samoa,' part iv., 1927), I enumerated four species of Lucanidæ and seven species belonging to the other families, which shows a similar proportion. In those islands, as in the Carolines, the very restricted range of the Lucanidæ is remarkable, all the species being apparently confined to one group of islands. In Samoa the seven other Lamellicornia are all widely distributed insects, evidently of extraneous origin. In the Carolines, on the contrary, non-indigenous species seem to be very few. Another noteworthy feature of the Lucanidæ in both groups of islands is their small size, all being far below the average for the family. The two Caroline species of *Dorcus* are amongst the smallest found in that large genus.

The new species may be called

Dorcus dublonensis, sp. n.

Black, sometimes with the femora and tibiæ very dark red; rather smooth but with the elytra and, in the female, the anterior part of the head and the sides and base of the pronotum finely punctured, the punctures very close except on the inner part of the elytra and the head of the female; elongate-oval, with short legs and antennæ, the front tibia closely serrate externally, with

the extremity feebly bifurcate, the middle and hind tibiæ each furnished with a sharp lateral spine. The shoulders of the elytra are acute.

Male.—The head is dull and bears only a few fine scattered punctures, the clypeal process short and broad, with its front margin straight. The pronotum is broad, rather scantily punctured at the sides and base, the lateral margins rather straight in the middle and slightly diverging anteriorly, contracted in front and behind and a little excised behind the produced front angles. The mandibles (in the type-specimen) are as long as the exposed part of the head, far apart at the base, straight except at the base and tip, and the inner edge of each bears a rather sharp tooth near the tip and a broad irregular laminar process near the middle.

Female.—The head is rather deeply punctured, except at the base, the clypeal process is narrow and feebly bilobed and the mandibles have each a rather sharp internal tooth. The pronotum bears very fine scattered punctures, except at the sides and near the base, where the punctures are close and deep. The lateral margin is gently curved, more strongly behind.

♂. Length (with mand.) 17 mm., (without mand.) 15 mm.; breadth 7 mm.

♀. Length 16 mm., breadth 7 mm.

CAROLINE ISLANDS: Mt. Tolomain, Dublon I., Truk Is.

Type in the Bishop Museum, Honolulu; co-type in the British Museum.

The female specimen is very slightly larger than the male, which may be taken as an indication that a rather greater development occurs in the latter sex, no doubt resulting in proportionally longer mandibles, but, since females are fairly constant in size, there is no reason to suppose that the largest males will be found to differ very considerably.

The three Caroline Island Lucanidæ may be easily distinguished by means of the characters contained in the following key:—

- | | |
|--|-----------------------------|
| 1 (4). Eyes not completely divided. | |
| 2 (3). Elytra closely punctured at the sides | <i>Dorcus dublonensis.</i> |
| 3 (2). Elytra thinly punctured at the sides | <i>Dorcus carolinensis.</i> |
| 4 (1). Eyes completely divided into upper and lower halves | <i>Agus alternatus.</i> |

EXPLANATION OF PLATE XIV.

- Fig. 1. *Dorcus dublonensis*, sp. n., male.
 Fig. 2. Ditto, female.
 Fig. 3. *Dorcus carolinensis* Arrow, male.
 Fig. 4. Ditto, female.
 Fig. 5. *Egus alternatus* Fairm., male.
 Fig. 6. Ditto, female.

All slightly enlarged.

XLIX.—On the Generic Nomenclature of certain Homoptera,
 with a Note on the Status of Family Names. By W. E.
 CHINA, M.A.

Superfamily **FULGOROIDEÆ.**

Dr. E. P. Van Duzee has recently published a note ('Pan Pacific Entomologist,' xv. no. 2, p. 66) on the standing of the genus *Liburnia* Stål. I therefore feel bound to state the other side of the case, first propounded by the late Dr. F. Muir (Proc. Hawaiian Ent. Soc. iii. (4) p. 332, 1917; and Bull. Exp. Sta. Haw. Sug. Plant Assoc., Ent. ser., Bull. no. 15, p. 18, 1924).

Van Duzee maintains that *Liburnia* Stål was actually a new name for the genus *Delphax* Latr. nec F. He also says that in 1807 Latreille designated *pellucida* F. as the type of *Delphax* Latr. by reason of his statement "*pellucida* Fabr. ejusd Delphacies *flavescens*, *striata*, *marginata*, *minuta*." Therefore, insists Van Duzee, the type of *Liburnia* is *pellucida* F.

We cannot agree with this interpretation. In the first place Latreille's statement does not, in our view, fix the type of *Delphax* Latreille nec. F. Secondly, there is in the Insecta only one genus *Delphax*, that of Fabricius, 1798. *Delphax* Latreille et auct. is not a validly established genus but only a misconception of *Delphax* F., 1798. Any fixations of genotype of *Delphax* auct. are really invalid fixations of *Delphax* F. Until a new name (*Liburnia*) was given to this "generic misconception," we could not for nomenclatorial purposes treat it as a genus, and the fixation of the genotype cannot antedate 1866, when the name *Liburnia* was given.

Liburnia was established by Stål in 1866 (Hemipt. *Africana*, iv. p. 179) with two synonyms, *Delphax* auctor.

and *Embolophora* Stål, 1853. The species were divided up in key form into section *a*, including *Embolophora monoceros* Stål, and section *aa*, including *Delphax vitticollis* Stål, *D. lautipes* Stål, *D. maculigera* Stål and *Cixius centralis* Sign. Muir declared that since Stål included *Embolophora* as a synonym of *Liburnia*, and that name has priority over *Liburnia*, the latter must henceforth be known as *Embolophora*, haplotype *E. monoceros* Stål. Van Duzee has argued that Stål meant to write *Delphax* Latr., and he would overcome the inclusion of *Embolophora* by assuming that the divisions *a* and *aa* were intended by Stål as subgenera. I have asked the opinion of various colleagues, and they are all of the opinion that *Delphax* auct. (as written by Stål) has no status as a genus and that *Liburnia* is in effect a new genus, and that its genotype must be selected from the species included under the original description. Dr. Uvarov suggested that the reason why Stål changed his generic name *Embolophora* to *Liburnia* may have been that his first name was a descriptive one and did not apply to all the species which he wanted to associate under one genus. Therefore, he renamed it *Liburnia* and sunk *Embolophora* as a synonym. This certainly supplies a motive for Stål's extraordinary behaviour. As to Van Duzee's second argument, even if we agreed that Stål effectively divided *Liburnia* into two subgenera, *a*, *Embolophora* with the haplotype *monoceros* and *aa*, *Liburnia* with *vitticollis*, *lautipes*, *maculigera* and *centralis*, and assumed, therefore, that Distant's 1906 genotype fixation of *monoceros* was invalid, then the genotype of *Liburnia* would still have to be one of the above four species, and cannot be *pellucida* F.

L. vitticollis has already been cited, by Muir (1917), thereby transferring the name *Liburnia* to the species at present placed under *Sogata* Distant and still leaving the *pellucida* F. group without a name, unless we use *Delphacodes* Fieber.

Personally, I am of the opinion that the fate of *Liburnia* Stål depended on the first type fixation. This was first cited by Distant (Faun. Brit. India, Rhyn., iii. p. 480, 1906) as *monoceros*, thereby irrevocably sinking *Liburnia* as a synonym of the South African genus *Embolophora*. Muir's 1917 fixation of *vitticollis* is invalid.

The synonymy of the confused genera runs as follows :—

EMBOLOPHORA Stål, 1853.

Haplotype : *E. monoceros* Stål, S. Africa.

Syn. *Liburnia* Stål, 1866. Logotype : *E. monoceros* Stål (cited by Distant, 1906).

DELPHACODES Fieber, 1866.

Logotype : *Delphax mulsanti* Fieb., S. France (cited by Muir, 1917).

Syn. *Delphax* Latr., 1807, et auct. Logotype : *D. pellucida* F. (cited by Latreille, 1807 ?).

Liburnia auct. nec Stål, 1866.

ASIRACA Latr., 1796.

Logotype : *Delphax clavicornis* (cited by Latr., 1810).

ARÆOPUS Spin., 1839.

Haplotype : *Cicada crassicornis* Pnz. (= *Delphax crassicornis* F.).

Syn. *Delphax* Fabr., 1798 (name preoccupied by *Delphax* Walbaum (ex Klein), Artedi, Ichth. (3) ed. 2, p. 579, 1792, Mammalia).
Genotype : *D. crassicornis* F., the single residual species after removal of *clavicornis* F. to *Asiraca* Latr.

Superfamily JASSOIDEÆ.

In his Check-List of the Hemiptera of America north of Mexico, 1916, Van Duzee brought forward the name *Cicadella* Latr., 1817, for that genus of Jassidæ, which up to that time had gone by the name *Tettigonia* Oliv., 1789, or *Tettigoniella* Jac., 1903. At the same time he drew attention to the fact that the Jassidæ (sens. lat.) had been given the group name *Cicadellæ* by Latreille in 1825 ('Fam. Nat. du Regne Animal,' p. 427), and should therefore be called *Cicadellidæ* instead of *Jassidæ*, as hitherto used since 1858 (Stål).

The generic name *Cicadella* Latr., 1817, had been missed by Kirkaldy in his Nomenclature of the genera of the Rhynchota ('Entomologist,' xxxiii. p. 265, 1900), because at first sight it appears to have been used as a group name for the Membracidæ, Cercopidæ and Jassidæ (sens. lat.) together. However, as pointed out by Van Duzee (in correspondence), Latreille ('Le Regne Animal,' iii.

p. 406, 1817) divided up the Homoptera into three "families" (p. 401), *Cicada* Oliv. (p. 402), *Fulgora* Lin. Oliv. (p. 404), and *Cicadella* (p. 406), one of which (*Fulgora*) he calls a genus. Under *Cicadella* he gives five divisions, *Ætalions* Latr., *Ledra* Fabr., *Membracis* Fabr., *Cercopis* Fabr. and *Tettigonia*, which he apparently regards as subgenera, since under *Ætalions* (p. 406) he refers to "the following subgenera."

Van Duzee rightly maintained that one of these five subgenera should take the name of the genus *Cicadella*, and appropriately assigned it to the subgenus *Tettigonia*, which Latreille, in the 1829 edition of 'Le Regne Animal,' refers to as "les Cicadelles propres." *Cicadella* Latr., 1817, therefore became a synonym of *Tettigonia* Oliv., but as the latter name was preoccupied by the Orthopterous *Tettigonia* L., 1758, *Cicadella* Latr. took its place, and of course had priority over *Amblycephalus* Curtis, 1833, and over *Tettigoniella* Jac., 1903, which was also proposed as a new name for *Tettigonia* Oliv., nec. L. Kirkaldy contended that Geoffroy's *Tetigonia*, 1762, spelt with one "t," was valid and different from the Orthopterous genus spelt with two "t's." Unfortunately we cannot agree with Kirkaldy that Geoffroy's 1762 work (Hist. Abreg. des Ins.) should be accepted, since it is not binomial. As pointed out by Kirkaldy, most of Geoffroy's genera were validated by Müller, in his Fauna Ins. Fridrichsdalina, 1764, who gave a comparative table of Linnean and Geoffroyan genera side by side. Unfortunately, however, he omitted *Tetigonia* Geoffr., which therefore is not validated until 1785 (Fourcroy, Ent. Paris, i. p. 193). Still, if this name is accepted as different by one letter from *Tettigonia* L., then it will antedate *Cicadella* Latr., 1817. Van Duzee states that the orthotype of *Cicadella* Latr. is *Cicada viridis* L., but there is no mention of this species in either the 1817, 1829 or 1836 editions of 'Le Regne Animal.'

It now appears that the name *Cicadella* was first used by Duméril in his Zool. Analyt., Paris ed., p. 266, 1806. He gave a correct generic description to cover the Jassidæ (sens. lat.) as opposed to the Membracidæ, Fulgoridæ, Cercopidæ and Cicadidæ, but he mentioned no species. In the German edition, translated by L. F. Froriep and published at Weimar in the same year (1806), specific

names are added to Duméril's genera, and under *Cicadella* (p. 267) is given the single species *Cicada vittata* L. This means that the well-known *Eupteryx* Curt., 1833, of the family Typhlocybidæ (=Eupterygidæ), in which genus *Cicada vittata* L. now stands, will become a synonym of *Cicadella* (Duméril) Froriep, while *Cicadella* Latr., 1817, which is preoccupied and must take another name, becomes *Amblycephalus* Curtis, 1833, orthotype *Cicada viridis* L. The synonymy of these confused genera is as follows :—

Family Typhlocybidæ (=Eupterygidæ).

CICADELLA Duméril, 1806.

Haplotype : *Cicada vittata* L.

Syn. *Eupteryx* Curtis, 1833. Orthotype : *Cicada picta* F. (= *atropunctata* Goeze).

Family Cicadellidæ (=Tettigoniellidæ).

AMBLYCEPHALUS Curt., 1833.

Orthotype : *Cicada viridis* L.

Syn. *Cicadella* Latr., 1817 (Van Duzee, 1917). Logotype : *Cicada viridis* L., cited by Van Duzee, 1917.

Tettigonia Geoffroy, 1762 (invalid), Fourcroy, 1785. Logotype : *Cicada viridis* L.

Tettigonia Oliv. 1789 nec L. Logotype : *Cicada viridis* L., preoccupied in Orthoptera.

Tettigoniella Jacobi, 1903, nom. nov. for *Tettigonia* Oliv. 1789 nec L. 1758.

The above cases give a striking example of the disadvantages of adopting the principle, advocated by McAtee (Proc. Biol. Soc. Washington, xxxi. p. 109, 1918), of basing the family name on the oldest genus instead of on the oldest group name. If the oldest genus principle is adopted, the name of the Typhlocybidæ, which Kirkaldy, followed by McAtee, changed to Eupterygidæ, must now be changed to Cicadellidæ, based on the oldest genus *Cicadella* Duméril. On the other hand, the oldest genus in the Tettigoniellidæ is *Cicadella* Latr., 1817, but since a family name based on this would be preoccupied by the other Cicadellidæ, it would be necessary to take the next oldest genus, *Proconia* Lep. & Serv., 1828, and call the family Proconiidæ. The subfamily in which *Cicadella* Latr. stands would take the name of the oldest genus,

which would be *Amblycephalus* Curtis, 1833, and become the *Amblycephalinæ*.

All these changes of family name are still not necessarily final, because a still older genus may some day be transferred into a family.

Families should therefore be based either on the oldest group name or better still should be fixed by the International Commission as that name which has been most used for the group in the past.

L.—*Neue Brenthiden und Lyciden von den Salomon-Inseln.* Von R. KLEINE, Stettin.

Brenthidæ.

ITHYSTENINI.

Ithystenus leveri, sp. n.

♂. Schwarzbraun, Schmuckstreifen auf den Elytren, schmutzig-orange, Schienen dunkelbraun; matt, Unterseite des Körpers und die Schenkel glänzend. Kopf mit durchgehender kräftiger Mittelfurche, neben der Furche runzelig, stark skulptiert, die Oberseite sonst dicht zart punktiert, Seiten spiegelglatt, Unterseite mit durchgehender Mittelfurche, daneben mehrere Reihen grosser, tiefer Punkte. Metarostrum flach und breit gefurcht; Mesorostrum bucklig erhöht, schmal, tief gefurcht; Prorostrum in der basalen Hälfte kräftig gefurcht; Metarostrum auf der Unterseite stark warzig skulptiert. Fühler ohne besondere Merkmale. Prothorax am Vorderrand quer gerieft, am Hinterrand mit einer tiefen Querfalte; Prosternum ohne Zäpfchen. Elytren von normaler Gestalt, Schmuckzeichnung auf der 3. Rippe fast bis zum Hinterrand reichend, auch auf der 4. und 5. vorhanden; Anhänge etwa $\frac{1}{4}$ der Elytrenlänge messend. Abdomen ungefurcht. Parameren Abbildung 1.

Abb. 1.



♀. Durch das kurze Prorostrum und die kleinen, dornartigen Elytrenanhänge unterschieden.

Länge (total) 31 mm. Breite (Proth.) 2 mm. (♂).

Länge (total) 18 mm. Breite (Proth.) 1.8 mm. (♀).

Salomon-Inseln: Guadalcanal, Lunga 24. ix. 1934 (R. A. Lever).

1 ♂♀. Typen im British Museum, London.

Die Art gehört in Gruppe 1, deren Parameren nicht taillenartig verengt sind. In dieser Gruppe findet sich keine Art mit Elytrenanhängen und mit einer Paramerenform wie bei *leveri*.

PSEUDOCEOCEPHALINI.

Chalybdicus popularis, sp. n.

♂. Schwarz, nicht metallisch, glänzend. Kopf am Halse tief dreieckig eingekerbt, bis zum Rüssel kräftig gefurcht, Oberseite, Wangen und Unterseite grob, tief punktiert; die Unterseite mit Borsten in den Punkten; Augen klein, vorgerückt. Metarostrum stumpf-kantig, nach dem Mesorostrum wenig verschmalert, Skulptur auf allen Seiten, auch die Behaarung der Unterseite wie beim Kopf; Mesorostrum wenig verbreitert, gefurcht; Prorostrum glatt, rundlich, so lang wie das Metarostrum. 2.–8. Fühlerglied breiter als lang, 9. und 10. quadratisch, 11. so lang wie das 9. und 10. zusammen, 9.–11. dicht behaart. Prothorax tief gefurcht, Oberseite und seitlich grob und tief punktiert, Prosternum nur flach skulptiert, in den Punkten kurz, zart behaart. Elytren am Absturz verlängert, aber keine eigentlichen Anhänge bildend, Reihenpunktiertung sehr gross und tief. Metasternum schmal gefurcht, 1. und 2. Abdominalsegment flach eingedrückt, überall grob skulptiert.

Länge (total): 19 mm. Breite (Proth.): 2 mm.

Salomon-Inseln: San Cristobal, Kirakira 9. v. 1935 (R. A. Lever).

♂. Typus im British Museum, London.

Uebersicht über die Arten.

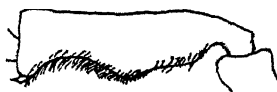
1. Einfarbig schwarz, ohne jeden Metallglanz,
am ganzen Körper tief rugos punktiert *popularis*, sp. n.
Mehr oder weniger metallisch glänzend, Punk-
tiertung immer zart und zerstreut 2.

- | | |
|--|-------------------------|
| 2. Metallisch stahlblau hochglänzend | <i>Hahnei</i> Kln. |
| Kupferig metallisch | 3. |
| 3. Elytren am Hinterrand mit flügelartigen
Anhängen, die gegen das Ende nach oben
gebogen sind, 1. und 2. Abdominalseg-
ment ungefurcht | <i>reverens</i> Kln. |
| Anhänge dornartig, ähnlich <i>Ithystenus</i> , 1. und
2. Abdominalsegment flach gefurcht | <i>cupronitens</i> Kln. |

Metatrachelus froggatti, sp. n.

Pechschwarz, hochglänzend, Schenkel, Schienen und Tarsen mehr oder weniger dunkel ziegelrot bis hellrotbraun. Kopf oberseits am Hinterrand flach, dreieckig eingekerbt, ungefurcht, ohne Skulptur; Unterseite mit filziger, am Grunde dreieckiger, dann schmaler Mittelfurche, die sich auf den Rüssel fortsetzt; Augen flach, weit vorgerückt. Metarostrum rundlich, vorn stumpfkantig mit kräftiger Mittelfurche, Seiten mit einzelnen grossen, in Reihen stehenden Punkten, Unterseite keilförmig gefurcht; Mesorostrum erweitert, an der Basis schmal, nach vorn zu breiter gefurcht, Unterseite mit scharfen Mittelkiel; Prorostrum normal erweitert, an der Basis kräftig gefurcht, Unterseite gekielt. 2. und 3.

Abb. 2.



Vorderschiene von *M. froggatti*.

Fühlerglied perlig, 4.–8. quer, kantig, 9. und 10. quadratisch, 11. so lang wie das 9. und 10. zusammen. Prothorax im basalen Teil äusserst fein und zerstreut punktiert. Elytren ausser der Sutura noch mit einer, vor dem Absturz verloschenen Rippe, Furchenpunktierung deutlich. Schenkel mit kräftiger glatt gedrückter Keule; Schienen platt, breit, vordere im Spitzenteil eingebuchtet, die mittleren etwas zarter, gerade, die hinteren sehr breit, Tarsen normal. Metasternum flach und undeutlich gefurcht, 1. und 2. Abdominalsegment gefurcht, 5. filzig behaart.

Länge (total): 13 mm. Breite (Proth.): 2 mm.

Salomon-Inseln: Bougainville, Ins. Kieta, 9. ix. 1937 (*J. L. Froggatt*).

♂. Typus in der Sammlung des British Museum, London.

Das Tier gehört in diese Gattung, obwohl die Form der Beine etwas abweicht. Die Schienen sind nicht schmal, sondern breit und erinnern an *Schizotrachelus*. Die Gattungsdiagnose ist dementsprechend zu ergänzen. Im übrigen besteht volle Uebereinstimmung mit der Diagnose. Alle bekannten Arten sind von Malakka und den Sunda-Inseln. *Froggatti* ist die erste Art aus dem Osten. Es scheint, als ob die Verbreitungsgebiete von *Metatrachelus* und *Schizotrachelus* die gleichen sind.

Lycidæ.

TRICHALINI.

Trichalus residuus, sp. n.

Abdomen schwarz, letztes Segment zuweilen aufgehell, Brust, Kopf, Schenkel und Schienen gelb, Tarsen dunkel, Fühler schwarz, 1.-3. Glied in wechselndem Umfange gelb, Schildchen gelb, Elytren im basalen $\frac{1}{4}$ gelb, sonst schwarz. 3.-11. Fühlerglied länger als breit, gezähnt. Prothorax am Hinterrand so breit wie in der Mitte hoch, Areole schmal, vorn kurz gestielt, Ränder kräftig aufgebogen, Randpunktierung gross, stark. Schildchen verkehrt herzförmig. Elytrengitterung vorherrschend quadratisch.

Länge: 8-9 mm. Breite (hum.): 1.5-2 mm.

Salomon-Inseln: Tulagi (*R. A. Lever*); Guadalcanal, Popanu; Guadalcanal, Bonu, 1200 ft., xi. 1934 (*R. A. Lever*).

2 ♂♂, 1 ♀. Typus im British Museum, London.

Die Ausfärbung ist ein Typus, der auf den Salomonen in den verschiedensten Gattungen festzustellen ist. In der Gattung *Trichalus* ist es die erste Art in dieser Ausfärbung.

Diatrichalus malcheri, sp. n.

Schwarzbraun, Prothorax orangegelb, nur am Vorderrand in den Vorderrandsareolen schwarz. Fühler schlank, 4.-10. Glied etwa gleich lang und nur schwach gezähnt, 3. Glied am längsten und von gleicher Länge wie das 11. Prothorax etwa quadratisch, Vorderrand rundlich, Seiten gerade, Hinterecken etwas spitz nach aussen vorgezogen,

Punktierung einzeln, flach. Schildchen verkehrt herzförmig. Auf den Elytren sind die Sekundärrippen nur an der Basis und am Hinterrand vorhanden.

Länge : 7 mm. Breite (hum.) : 2 mm. *circa*.

Salomonen-Inseln. Neu-Georgia : Pauru (*Fr. Malcher*).

2 ♀♀. Typus im Dresdener Museum.

Verwechslung mit einer anderen Art ist nicht möglich, da es keine mit gelbem Prothorax gibt.

LI.—*A new Triassic Rhynchocephalian from Gloucestershire*. By W. E. SWINTON, Ph.D., F.R.S.E., Geological Department, British Museum (Natural History).

INVESTIGATIONS upon the fissures in the Carboniferous Limestone at Tortworth, near Thornbury, Gloucestershire, have recently been undertaken by Mr. F. G. Hudson, President of the Cotteswold Field Club, and have been rewarded by the discovery of a large number of fragmentary remains of a small fossil reptile contained in the infilling.

The Carboniferous fissures were filled in during Keuper times, and there is no doubt that the bones are also of this age. They reveal the presence, for the first time, of a small Rhynchocephalian closely allied to a Triassic South African form. It is distinct from all similar forms so far described, from England or elsewhere, and is accordingly referred to a new genus and species of the family Sphenodontidæ.

I am greatly indebted to Mr. Hudson for allowing me to describe the material, and for presenting the types to the Geological Department of the British Museum.

Clevosaurus hudsoni, gen. et sp. n.

(The generic name is derived from *Clevum*, the Roman term for Gloucestershire, while the trivial name records appreciation of the work of Mr. F. G. Hudson, the discoverer of the fossils.)

Diagnosis.—A small Sphenodont reptile having its lower tooth row almost as large as the mandibular ramus. Teeth acrodont, conical, with the cone medially placed

and vertically directed, with greatest width and greatest length approximately equal; stoutly built, regularly arranged and without diastemata. Second sacral rib distally bifurcate.

Syntypes.—Part of upper jaw; portions of right and left mandibles with teeth.

Regd. R. 5939. Geological Department, British Museum (Nat. Hist.).

Horizon and Locality.—Trias (Keuper) of Tortworth, near Thornbury, Gloucestershire.

Description.—The material submitted by Mr. Hudson to me for examination consists of some forty pieces of red grit containing portions of the jaws, vertebræ, limb and girdle bones of the reptile. There appear to be no remains that cannot be referred to this form. It is true to say that the grit is full of bones, but most of them are too fragmentary to permit of identification.

The fragments of the jaws are three in number, one portion being from the upper jaw and the others from the mandible. These all bear teeth, which in shape, structure, and arrangement are quite similar and yet quite distinct from those of all the other *Sphenodontidæ* so far described.

The maxillary fragment is small, about 10 mm. long and 6 mm. broad. Four complete teeth are shown, forming a series of cheek-teeth 7 mm. long. The widest part of this row is at the 3rd tooth, where the width is just 2 mm. The teeth increase gradually in length and height in this little series, and the last of them appears to have a little cusp upon its hinder side.

As to the bones of the upper jaw itself, nothing, apart from size, is discernible.

The mandibular fragments are both from similar regions of the jaw; one is from the right side and the other from the left, and together they indicate a mandible about one-third the size of that of a normal adult *Sphenodon*.

The bones are quite similar to those of *Sphenodon*, but the teeth are dissimilar and characteristic.

The teeth are acrodont, conical, upwardly directed, and with their greatest width about equal to their length. They are stoutly built, and the posterior surface is either slightly convex or very slightly concave while the anterior surface is concave. They are regularly arranged in a

series of increasing size without diastemata or the interpolation of irregular teeth.

Although their nearest resemblance is with the teeth of *Palacrodon browni*, from the Trias of South Africa (Broom, 1906), they are distinguished from them by being less elongated, by being thicker and stouter, and in having no tendency towards the tricuspid appearance that is imparted to *Palacrodon* teeth by their well-developed anterior and posterior basal margins.

They are different in much the same way from the long and comparatively low teeth of *Acrosaurus* (v. Andreae, 1893), in which the well-developed teeth appear to point slightly backwards.

The teeth of *Homœosaurus* (v. Ammon, 1885) belong to this group with somewhat similar dental characters, but in this genus there is much less difference in size between the individual teeth, and quite different proportions between the size of the dental series and the lower jaw as compared with the new form.

The American *Opisthias* (Simpson, 1926) has readily distinguished sub-triangular, but closely set, teeth with an inner and posterior flange, and is quite dissimilar.

In *Pleurosaurus* (Dames, 1896) the dental arrangements are quite different from the genera mentioned above. Here the teeth are small compared with the jaw, are widely spaced, closely similar in size, and more needle-like.

In *Sphenodon* itself, in *Polysphenodon* (Jaekel, 1911), and in *Theretairus* (Simpson, 1926) the dental characters are somewhat intermediate between the conditions described above for *Pleurosaurus* and the earlier-mentioned genera, but there is no doubt whatever that they are all clearly and readily distinguishable from the new form.

The teeth have not been seen in *Brachyrhinodon* or in *Chometokadmon*, but the general proportions and conditions of the skull and skeletal elements preclude the Gloucester specimen from being referred to them. Careful comparison shows that the dental characters of all the genera referred to above are constant and characteristic.

There are also several impressions and portions of vertebræ, but six of the latter are good enough to be selected for detailed comparison.

There is a striking similarity between these centra and those described by Ammon (1885) for *Homæosaurus*. Half of the centra are, curiously enough, sacral, and of these two have the rib bifid distally as in the second sacral of that genus.

Among the other remains there are a large number of fragments, some of which are identifiable as from humeri, femora, tibiæ and metatarsals. They are all closely similar to those of *Homæosaurus*, even to the absence of an entepicondylar foramen on the humerus; but the bones from Gloucestershire are stouter and obviously from a larger and more robust animal, at least than that figured by Ammon. The animal must have been about a foot in length.

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LII.—*Beiträge zur Kenntnis der Conopiden*.—IV.

Von O. KRÖBER, Hamburg.

(Continued from p. 543.)

IV. DIE CONOPIDEN DER AUSTRALISCHEN REGION.

Zum ersten Male liegt ein reiches Material aus diesem so sehr interessanten Gebiet vor, das beweist, dass diese Fauna mit der orientalischen kaum Berührungspunkte aufweist. Von den bisher beschriebenen 30 Arten haben mir 24 in typischen Stücken vorgelegen, so dass wir über die systematische Stellung fast aller Spezies heute im

Klaren sind. Aus den 6 vertretenen Gattungen der Conopinæ sind heute 11 geworden, aus den bisher beschriebenen 30 Arten: 42. Dazu kommt 1 *Myopa* und 1 *Stylogaster*.

Uebersicht über die Gattungen der Conopinæ.

1. Das 3. Fühlerglied ist nie das längste. 2.
- Das 3. Fühlerglied ist weitaus das längste. 3.
2. Hinterleib wespenartig; 2. Segment länger und dünner als das 3. 1. Hinterrandzelle kurz. Kleine Querader im hinteren Drittel der Discalzelle. *Physocephala* Schin.
- Hinterleib robust, wenig an der Basis verdünnt; 2. und 3. Segment gleich lang. 1. Hinterrandzelle lang und spitz endend. Kleine Querader etwa auf der Mitte der Discalzelle. *Conops* L.
3. Rüssel 2–2½ mal so lang wie der Kopf. 3. Fühlerglied mindestens 3 mal so lang wie das 1. oder 2. 4.
- Rüssel ca. 1½ mal so lang wie der Kopf oder in der Mundhöhle verborgen. 6.
4. Kopf mit lang vorgestrecktem Fühlerhöcker. Fühlergriffel 3-gliedrig. Thorax behaart. Hinterleib schlank, parallelrandig. *Stenoconops*, n. gen.
- Kopf rundlich. 5.
5. Schildchen und Thorax fast nackt. *Paraconops* Krb.
- Schildchen und Thorax stark behaart. *Neoconops* Krb.
6. Rüssel meistens fleischig, kopflang, in der Mundhöhle verborgen. Fühlergriffel 2-gliedrig. 7.
- Rüssel chitinos, ca. 1½ mal so lang wie der Kopf. 8.
7. 1. Hinterrandzelle kurz wie bei *Physocephala* aber lang gestielt. Hinterleib parallelrandig. Ozellenhöcker mit 2 Ozellen (mit einer Ausnahme). Stirn gefurcht. *Heteroconops* Krb.
1. Hinterrandzelle lang wie bei *Conops*, mässig lang gestielt. Stirn gefurcht. Augenrand mit Schwielen. [n. gen.] *Delkeskampomyia*,
8. 1. Hinterrandzelle wie bei *Heteroconops* mit sehr langem Stiel. Behaarte Art. *Smartiomysia*, n. gen.
1. Hinterrandzelle wie bei *Conops*, mässig lang gestielt. Meistens fast nackte Arten. 9.
9. Grosse, plumpe Arten von 9–14 mm. mit grösstenteils rotgelbem Körper. Fühler wie bei den meisten *Conops*-Arten gebaut. Griffel 3-gliedrig; das 3. Glied kommt stark abgespreizt aus dem 2. heraus. *Chrysidiomysia*, n. gen.
- Kleine Arten von höchstens 9 mm., die immer schwarz gefärbt sind, eventuell mit Silber- oder Goldfleckung. Fühler schlank gebaut. 10.

10. Stirn und Scheitel am Augenrand bis eben unterhalb der Fühler mit einer schwarzen, glänzenden Schwiele. Ziemlich behaart *Callosiconops*, n. gen.
 Stirn und Scheitel ohne solche Schwielenbildung *Microconops* Krb.

CONOPS L.

Die Arten lassen sich am besten in 3 Gruppen ordnen :

1. Grosse, brandrot und schwarz gefärbte Tiere, die statt des Ozellenhöckers eine kleine Grube tragen [de Meij.
 1. Gruppe *seminiger*
 Sehr plump gebaute tiefschwarze Arten mit goldroter oder goldgelber Zeichnung, die fast immer einen Ozellenhöcker mit 2 deutlichen Ozellen tragen 2. [Newm.
 2. Gruppe *aurosus*
 2. Grosse Tiere von über 13 mm. 3. Gruppe *piceus* Big.
 Kleine Tiere von 8–11 mm.

Gruppe SEMINIGER.

1. Thorax rotbraun, event. mit schwarzer Mittelstrieme *C. thoracicus*, n. sp.
 Thorax schwarz 2.
 2. Abdomen schwarz, vom 3. Ring an goldgelb tomentiert *C. metaxantha* Walk.
 Abdomen am 1., eventuell 1. und 2. Tergit schwarz, sonst brandrot 3.
 3. Schildchen rotbraun. Nur der 1. Ring schwarz. Theka schwarz. Analsegment rotgelb *C. seminiger* de Meij.
 Schildchen schwarz. 1. und 2. Ring schwarz. Theka rotgelb [Meijerei, n. ssp.
C. seminiger var. *de*

Gruppe AUROSUS.

1. Stirn und Scheitel ganz rotgelb. Keine Ozellen. Schildchen, ein Fleck davor, Hinterrücken rotbraun, rotgolden tomentiert *C. satanicus* Big., ♂♀.
 Scheitel mit 2 Ozellen 2.
 2. *p* schwarz *C. aptatus* Walk., ♀.
p rotgelb 3.
 3. Stirn mit senkrechter Strieme. Vor dem Schildchen eine rotgelbe Makel (*C. bulbimus* Wlk., ♂) *C. aurosus* Wlk., ♂♀.
 Stirn mit T-förmiger Strieme. Vor dem Schildchen kein Fleck [n. sp., ♀.
C. pseudocellifer,
 (Hierher vielleicht *C. claviventris* Thoms.)

Gruppe FICUS.

(Alle Arten haben 2 deutliche Ozellen.)

1. 2. und 3. Tergit mit goldgelber oder goldroter Binde 2.
 Nur das 2. Tergit mit Binde; 3. ganz schwarz 4.
 2. Gesicht gelb, nur die Backen schwarz *C. splendidus* Krb., ♂.
 Gesicht schwarz, nur mit 2 gelben Schwielen neben den Gruben 3.

- | | |
|--|-------------------------------|
| 3. Toment tief goldrot | <i>C. perbellum</i> , n. sp. |
| Toment goldgelb | <i>C. picus</i> Big. |
| (Hierher wohl <i>C. ocellifer</i> de Meij.) | |
| 4. Untergesicht gelb | <i>C. uncinatus</i> , n. sp. |
| Untergesicht schwarz, nur mit 2 gelben | |
| Schwielen neben den Gruben | 5. |
| 5. Abdominalbinde weissgelb (<i>C. picus</i> | |
| Macq., ♂) | <i>C. æquatus</i> Walk., ♀. |
| Abdominalbinde satt rotgoldig (<i>C. aureo-</i> | |
| <i>rufa</i> Macq., ♂) | <i>C. inglorior</i> Walk., ♀. |

Von orientalischen Arten kommt nur *C. nubeculosus* Big. im Gebiet vor.

Von den übrigen, bisher als *Conops* geführten Arten gilt folgendes:

C. sphegiformis Walk., Type vollkommen unbrauchbar, besteht nur aus Kopf und Brust ohne Fühler, Beine, Flügel. Der Kopf war angeleimt. Nach der Beschreibung dürfte es sich um eine *Physocephala*-Art handeln. Ist wohl am besten zu streichen.

C. nigrotestaceus Macq., und wahrscheinlich auch *C. emarginatus* Macq. sind identisch mit *Physocephala pallipes* Krb., welch letzterer Name also fallen muss.

C. pica Macq., ♂, ist trotz des fehlenden Abdomens wohl als *C. æquatus* Walk. zu deuten.

C. macer Big., ohne Abdomen, ist eine *Physocephala*-Art.

C. thoracicus, n. sp., ♀, von N.S. Wales. Type: London. Länge 15 mm. Fühler 4·5 mm.; Flügellänge 11 mm., -breite 13 mm.

Gleicht sehr *C. seminiger*. Stirnmakel vorhanden. Stirn und Scheitel schwarz, gefurcht. Untergesicht rotgelb, gelbschimmernd. Kiel unten schwarz, ebenfalls die Fühler und der Hinterkopf. Thorax und Schildchen rostrot. Eine schwarze, breit beginnende Mittelstrieme reicht, sich stark verschmälernd, bis zur Quernaht. Hinterrücken, Pleuren schwarz, zart weisslich bereift. Hüften rotbraun, weiss-schimmernd. *p* gelbbraun, *t* silberglänzend, *f* zart weiss schimmernd. Tarsen schwarz, Hintertarsen braun. Haftläppchen und Klauen weissgelb, die Spitzen der letzteren schwarz, Endglied der Tarsen mit sehr langen, feinen, schwarzen Haaren. Schwinger und Schüppchen dunkelgelb. Flügel bis zur 4. Längsader braun tingiert. 2. Basalzelle und Basis der Discalzelle

etwas bräunlich. Basis des 1. Tergits schwarz, unscharf begrenzt; 2. ganz brandrot; 3.–5. sammetschwarz; 6. und Analsegment brennend rot, goldgelb tomentiert. Genitalien glänzend rotgelb mit schwarzer Spitze. Theka gross, dornförmig, schwarz. Behaarung zart schwarz, am 1. Tergit länger und dichter. 6. Tergit seitlich schwarz. Bei 1 ♀ von N.S. Wales ist die Thoracalstrieme nur angedeutet. 1. Ring fast ganz brandrot; 6. seitlich bis Schwarz verdunkelt.

C. metaxantha Walk., ♂, von Deutsch Neu Guinea, Cyclops Mts., Sabron, 900 ft., v. Ursprünglich von Waigeo beschrieben.

Länge 11.5 mm. Fühler 3.3 mm.; Flügellänge 9 mm., -breite 3 mm.

Eine sehr schön gefärbte Art. Tiefschwarz. Unter- gesicht dunkel rotgelb, mit Ausnahme der Unterseite des Fühlerhöckers glänzend goldgelb. Ein feiner Goldstrich reicht bis zum Scheitel. An seiner Grenze liegt eine wenig auffällige schwarze Sammetmakel. Stirn und Scheitel stark gefurcht. Vertexkissen statt des Ozellenhöckers mit einer Grube, im Ton rotbräunlich. Gesichtsgruben unten nebst Kiel schwarz. Rüssel fast doppelt so lang wie der Kopf, ziemlich schlank, schwarz, die Mitte rotbraun. Fühler schwarz, 1. Glied ca. 5 mal so lang wie breit; 2. ca. $1\frac{1}{2}$ mal so lang wie das 1.; 3. gleich dem 1., etwas düster rotbraun; Griffel lang, 3 teilig. Hinterkopf schwarz, mit Goldschimmer quer über die Scheitelblase und am Augenrand. Thorax schwarz, durch Toment etwas olivbraun, mit den Anfängen von 2 gelblichen Längstriemen. Schulterbeulen und Partie innerhalb etwas gelb tomentiert. Pleuren und Hüften etwas gelblich tomentiert, desgleichen die Partie vor dem Schildchen und die Seitenplatten des Hinterrückens. *f* schwarz, die Spitze unten, die Gelenke dunkel rotgelb. *t* dunkel rotgelb, Spitze verdunkelt, Toment intensiv gelb. Tarsen schwarz, Haftläppchen und Klauen gelblich, Spitze schwarz. Schwinger gelb, Schüppchen bräunlich. Flügel bräunlich mit dunkelbrauner Strieme. Vorderrand- und Basalzelle etwas gelblich im Ton. 1. Hinterrandzelle ganz braun bis zur *vena spuria*. Hinterleib glanzlos, schwarz. 1. Ring seitlich etwas graugelb tomentiert, lang schwarz behaart; 2. am Hinterrand seitlich etwas

gelb tomentiert. Vom 3. Ring an alles goldgelb tomentiert. Bei seitlicher Betrachtung erscheint der ganze Hinterleib goldgelb übergossen.

C. seminiger de Meij., ♂, von N.S. Wales.

Stirn ganz schwarz, Blase dunkelbraunrot, Kiel unten schwarz. Griffel 3 gliedrig. 2. Tergit eigentlich ganz schwarz mit kaum durchschimmernden roten Fleckchen. Die schwarzen Sammetmakeln am Augenrande erkennbar.

Var. *de Meijerei*, nov. var., von Waigeo und Australien. Type: London.

Länge 14 mm. Fühler 4·5 mm.; Flügellänge 11·5 mm. -breite 3·5 mm.

Thorax hinter der Quernaht jederseits mit einem gelblichen Tomentfleck. Schildchen nur am Rande etwas rotbraun. Seitenplatten des Hinterrückens mit einer Schillerstrieme. 1. Tergit fast ganz schwarz oder seitlich unscharf rotbraun. Theka breit, dornförmig, ganz rotgelb, nur die Spitze unten schwarz. Flügel bis zur 4. Längsader etwas bräunlich, auch beide Basalzellen und die Basis der Discalzelle.

C. satanicus Big., ♂♀, Adelaide. Type ♀: Berlin.

Länge, ♂ 16, ♀ 18 mm. Fühler 4 mm.; Flügellänge 11 mm., -breite 3 mm.

♂. Untergesicht tiefschwarz mit Silberglanz. Stirn und Scheitel ganz rostrot. Ozellenfleck und Ozellen fehlen. Fühlerhöcker oben schwarz. Stirn gefurcht. 1. Fühlerglied hellrotgelb, ca. 5 mal so lang wie breit. Der Rest fehlt. Gesichtsruben gelbbraun, intensiv silberschimmernd. Hinterkopf und Thorax schwarz. Schulterbeulen wie bei *C. aurosus*. Schildchen rostrot, davor ein goldroter Fleck. Hinterrücken tiefschwarz, oben nebst Seitenplatten goldrot. Pleuren schwarz, etwas silberschimmernd. *p* schwarz. Spitzendrittel der *f*, Basalhälfte der *t* rotgelb. Tarsen braun. Haftläppchen und Klauen weissgelb, Spitze schwarz. Endglied der Tarsen mit langen, schwarzen Haaren. *f* und Tarsen schwach, *t* intensiv silberschillernd. *t*₃ an der Spitze innen zart aber dicht goldgelb behaart. Sonst ist alle Behaarung schwarz. Schüppchen weissgelb. Schwinger dunkel rotgelb. Flügel intensiv braun zwischen der 1. und 4. Längsader. Beide Basalzellen, Basalpartie und Ränder der Discalzelle braun.

1. Hinterrandzelle braun, Analzelle basalwärts. Hinterleib tief sammetschwarz. 2. Tergit mit breiter goldroter Binde, die hinten den Bauch erreicht, 5. mit grossem, goldrotem Hinterrandfleck, 6. mit solchem Kreis, der nur die Seiten freilässt. Genitalien schwarz.

♀. Gleicht in allem dem ♂. Der Silberschiller des Gesichts reicht mit fein gelblichem Ton bis zum Scheitel. Keine Ozellen. Hinterkopf tief schwarz, unten silbern. Rüssel ca. $1\frac{1}{2}$ mal kopflang, stark, schwarz, die Mitte rotbraun. Fühler lang. 1. Glied wie beim ♂ rotgelb; 2. und 3. schwarz; 2. ca. $\frac{1}{3}$ länger als das 1.; 3. gleich dem 2. Endgriffel 3 gliedrig. Thorax vor dem Schildchen nebst den Beulen brandrot, goldig tomentiert. *p* wie beim ♂, aber heller. Abdomen noch intensiver gefärbt. 2. Tergit fast ganz goldrot, hinten den Seitenrand erreichend, vorn dreieckig zugespitzt. Vorderrand schwarz. 3.–5. tief sammetschwarz. 6. mit intensiv goldrotem Fleck, der nur die Seiten tief schwarz lässt. 7. Genitalien und Theka schwarz. Flügel wie beim ♂.

In meiner Beschreibung von *C. aurosus* Newm. p. 60 als Varietät davon aufgeführt.

C. aptatus Walk., ♀, von Westaustralien. Type: London.

Die Type ist offenbar stark ausgebleichen, da die Binden blassgelb sind und seitlich silberweiss werden! Man ziehe also die Originalbeschreibung heran!

Länge 13 mm. Fühler 4 mm.; Flügellänge 9 mm., -breite 3 mm.

Kopf dunkelrotgelb, vor dem Scheitel fast rot. Backen mit braunem Fleck. Stirn mit breiter, rein brauner, senkrechter Strieme. Scheitelblase schwärzlich, Ozellenhöcker mit 2 Ozellen. Fühler tiefschwarz. 1. Glied ca. 4 mal so lang wie breit; 2. ca. $1\frac{1}{2}$ mal so lang wie das 1.; 3. so lang wie das 2. Endgriffel 3 gliedrig. Das Exemplar zeigt keine Borste, das 3. Glied ist nur konisch zugespitzt. Kopf ohne Goldtoment. Am Augenrand der Stirn ein feiner Silberstrich. Rüssel dick, schwarz, ca. $1\frac{1}{2}$ mal kopflang. Thorax, Schildchen, Hinterrücken glänzend schwarz. Ueber die Schulterbeulen zieht sich ein weissgelb schimmernder Strich hin, der aber nicht in die Strieme der Brustseiten übergeht, die breit und silberweiss ist. Hinterrücken, besonders die Seitenplatten, weiss. *p*

schwarz, *t* und *f* dick silbern tomentiert; *f* nur an der Spitze unterseits schwarz und die *t* an der Innenseite. Tarsen schwarz. Haftläppchen bräunlich. Klauen rotbraun mit schwarzer Spitze. Hüften schwarz, silberweiss tomentiert. Abdomen tiefschwarz. 2. Ring mit weissseidigem Hinterrandsaum, vor dem eine breite Binde liegt, deren Mittelpartie goldgelb schimmert; 5. mit weisslichem, nach oben hin gelb werdendem Seitenfleck. Zwischen diesem Fleck und der Binde liegt ganz zarter weisser Schimmer. 6. Ring mit goldgelbem Fleck. Genitalien und Theka schwarz, letztere vorne braun. Flügel graulich, Basalzellen besonders hell. Vorderrandbinde schwarzbraun bis zur *vena spuria*. Beide Flügel sind abnormal, indem von der Spitze der 1. Basalzelle durch eine Querader ein Dreieck abgeschnittend wird.

Conops aurosus Newm., ♂♀ (= *bulbimus* Walk.), entspricht meiner Beschreibung vom ♂ (Type gesehen!) und dem ♀ von Cap York (Type von *aurosus* Newm., ♀ gesehen). Die Beschreibung des zweiten ♀ (von Neuholland) erweitere ich zur Beschreibung von *Conops pseudocellifer*, n. sp., ♀, von Neuholland. Type: Berlin.

Kopf hellgelb. Untergesicht weiss schimmernd. Backen braun, Stirn mit brauner T-Zeichnung wie bei *ocellifer*. Die Strieme verbreitert sich nach unten bis zur Breite des Fühlerhöckers. Furchung sehr flach. Ozellenhöcker mit 2 Ozellen. Scheitelblase gelb. Gesichtsruben oben schwarzbraun. Kiel gelb. Hinterkopf schwarz, am Augenrand weiss schimmernd. Am Thorax sind nur die Schulterbeulen goldrot. Die Seitenplatten des Hinterrückens mögen goldrot gewesen sein. *p* gelbbraun, wie gewöhnlich. Flügel mit hellbrauner Binde zwischen der 1. und 2. Längsader und bis zur *vena spuria*. 3. Tergit mit schmaler bogenförmiger goldroter Binde, die die Seiten nicht erreicht. 5. und 6. Tergit ganz rotgelb, goldrot tomentiert. 5. seitlich schwarz. Theka rostbraun, unten schwarz. Das Exemplar scheint ausgeblichen zu sein.

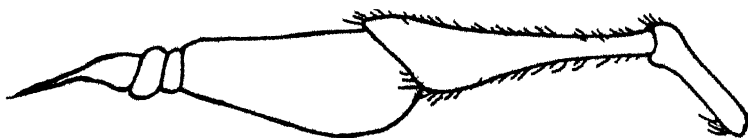
Conops perbellum, n. sp., ♂, von W. Australien, Marloo Station, Wurarga, vii. Type: Berlin.

Länge 9.5 mm. Fühler 2.5 mm.; Flügellänge 6 mm., -breite 2.5 mm.

Kopf wei bei *B. piceus* Big. Augenrand auch neben der Stirn haarfein silberglänzend Ozellenhöcker sehr

schwach entwickelt, mit 2 rotgelben Ozellen. Fühler wie bei *piceus*. Griffel 3 gliedrig. Schillerfleck am Untergesicht messinggelb. Thorax tiefschwarz, nur Schulterbeulen und Seitenplatten des Hinterrückens satt goldrot. Keine Bruststrieme. *p* dunkel braungelb. Hüften schwarzbraun, etwas gelbschimmernd. *f* schwarzbraun, an den Enden düster braungelb; *t* etwas schillernd. Tarsen braungelb, gegen das Ende kaum etwas verdunkelt. Haftlappchen gelbbraun. Klauen rotbraun mit schwarzer Spitze. Schüppchen, Schwinger gelblich. Flügel hyalin mit tiefbrauner Binde wie bei *piceus*. Der Raum unterhalb der *vena spuria* grösstenteils hyalin. r_3 im Verlauf ganz gerade. Hinterleib tiefschwarz, glanzlos. 2. und 3. Ring satt rotorange, mit schmalen, schwarzem Vorder- und Hinterrand. 6. Ring mit fast kreisförmigem, grossem, satt goldrotem Fleck. Genitalien und Bauch tiefschwarz.

Fig. 9.

*Conops piceus* Big., ♂. Fühler.

Conops piceus Big., ♂. Type: London, von Australien (Abdomen fehlt!).

2 ♂♂ von S.W. Australien, Yallingup, xi. und 14. ix. – 31. x. stimmen vollkommen mit Type und Beschreibung überein.

Länge 8–8.6 mm. Fühler 2 mm.; Flügellänge 5 mm., -breite fast 2 mm.

♂. Kopf schwarz, nur neben den Gruben liegt ein gelbe Schwiele, die am Fühlerhöcker endet. Scheitelblase dunkelbraun. Ozellenhöcker schwarz, 2 rotbraune Ozellen. Am Augenrand liegt eine weiss-schillernde Stelle, in Fühlerhöhe beginnend. Stirn gefurcht. Scheitelblase und Hinterkopf dicht zart abstehend schwarz behaart. Hinterkopf unten am Auge weiss-schillernd. Rüssel schwarz, ca. $1\frac{1}{2}$ mal kopflang. Fühler schwarz. 1. Glied ca. 3 mal so lang wie breit; 2. ca. $\frac{1}{3}$ länger als das 1. 3. fast so lang wie das 2. Endgriffel 3 gliedrig, mit langer Borste. Pleuren schwarz, fast glanzlos. Schulterbeulen

und Seitenplatten des Hinterrückens intensiv goldgelb tomentiert. Die Strieme der Pleuren endet, immer schmaler und blasser werdend, an den Mittelhöften. Hüften dunkelbraungelb, weissschillernd. *f* dunkelbraun, die Enden heller. *t* hellgelbbraun, *t*₃ in der Spitzenhälfte braun. Metatarsen gelbbraun, der Rest braun. Haftläppchen gelbbraun, Klauen dunkelbraun. Schüppchen und Schwinger weissgelb. Flügel grauhyalin, stark irisierend. Die Binde bis zur 2. Basalzelle und zur Basis der Discalzelle reichend, dunkelbraun, in der 1. Hinterrandzelle bis unter die *vena spuria*. 2. Basalzelle, Vorderrandzelle und 1. Hinterrandzelle etwas heller. Abdomen sammetschwarz, glanzlos. 2. und 3. Tergit mit prachtvoll goldgelber Hinterrandbinde, die ca $\frac{2}{3}$ der Ringbreite einnimmt. 6. Ring mit fast kreisrundem, goldgelbem Fleck. Genitalien schwarz.

(Hierher gehört vielleicht *C. ocellifer* de Meij., die ich nicht kennen lernte.)

Fig. 10.

*Conops uncinatus*, n. sp., ♂. Fühler.

Conops uncinatus, n. sp., ♂♀. ♀ als *pica* von mir beschrieben. Type: Berlin. ♂ von S.W. Australien, Kalamunda, 9. iii.–11. iii. Type: London.

2 ♂♂: Länge 7·5–9 mm. Fühler 2–2·5 mm.; Flügel-länge 5·5–6 mm., -breite 2–2·3 mm.

3 ♀♀: Länge 8 mm. Fühler 2·1 mm.; Flügel-länge 6·2 mm., -breite 2·1 mm.

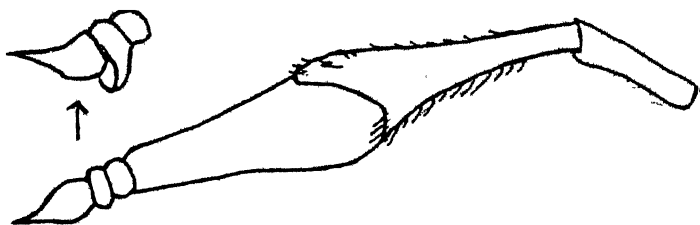
♂. Untergesicht nebst Gruben und Kiel dunkelgelb. Backen schwarz. Unterer Teil der Gruben und Augenrand weissschimmernd. Scheitel schwarz, Blase dunkelrotbraun, davor eine breite Querbinde, von der eine Längstrieme bis zu den Fühlern reicht, beide schwarz. Ozellenhöcker schwarz mit 2 rotgelben Ozellen. Rüssel dünn, ca. 2 mal kopflang, schwarz, mit rotbrauner Spitze. Fühler schwarz, 1. Glied ca. 4 mal so lang wie breit; 2. ca. $1\frac{1}{2}$ mal so lang wie das 1.; 3. = dem 1. Griffel

3 gliedrig. Stirn ohne Furchen. Hinterkopf schwarz, unten am Augenrand silberglänzend. Thorax schwarz, Beulen goldgelb, auch die Oberpartie des Hinterrückens und die Seitenplatten. Schüppchen und Schwinger gelb. Brustseiten schwarz, etwas weisschimmernd. Hüften schwarzbraun, weisschillernd. p gelbbraun, f_3 mit dunklem Basalring, f_2 mit Spuren davon. t_3 Spitze schwarzbraun; t_2 etwas verdunkelt, Tarsen gegen die Spitze hin. Flügel bräunlich tingiert; die braune Binde lässt die Vorderrandzelle, die 1. Basal-, Discal- und 1. Hinterrandzelle eigentlich frei; sie wird also begrenzt

mit goldgelber Binde und schwarzem Vorderrand. 6. Ring ganz goldgelb. Genitalien und Bauch schwarz.

♀. Gleicht dem ♂. f ohne dunkle Binde. f_1 an der Basis mit dunklem Fleck. t_3 mit bräunlicher Makel. Flügel intensiver gefärbt. Analzelle vorn und Discalzelle unten von braunem Schatten begleitet. Theka gross, dornförmig, schwarz. 1 ♀ trägt innerhalb der Schulterbeulen einen weisschillernden Fleck.

Fig. 11.

*Conops aequatus* Wlk., ♀. Fühler.

Conops aequatus Wlk. (syn. *pica* Macq., ♂) von S.W. Australien, Yallingup, xi.

Länge 11.1 mm. Fühler 3 mm.; Flügellänge 7 mm., -breite fast 3.

Kopf wie bei *C. piceus*. Scheitelblase rotbraun, Mitte der Stirn rotbraun verdunkelt. Thorax und p wie bei *piceus*. Flügel schwarz. Hinterleib nur mit einer blassgelben Binde am 2. Tergit und mit einem ±halbmondförmigen Fleck am 6. Seiten des 6. Ringes und Analsegment glänzend schwarz. Theka gross, dornförmig,

rotbraun, die Spitze unten schwarz. 3. Tergit mit rotgelbem, länglichem Seitenfleck, der offenbar goldgelb tomentiert war.

♂. Länge 9·5 mm. Fühler 3 mm.; Flügellänge 7 mm., -breite 2·2 mm., von W. Australien.

Conops inglorior, ♀, von Australien. Type ♀: London.

Länge 10 mm. Flügellänge 7·5 mm., -breite 2·5 mm.

Ist vielleicht das andre Geschlecht zu *C. aureorufa* Macq.

Hat viel Aehnlichkeit mit *C. pseudocellifer*, aber die Stirnstrieme fehlt. Gesichtsruben und Kiel fast ganz schwarz, Untergesicht schwarz mit 2 gelben Schwielen und einem goldgelb tomentierten Flecken am Augenrand. Stirn schmutzig olivbraun, Scheitelblase schwarz. Ozelnhöcker mit 2 dunkel rotgelben Ozellen. Fühler schwarz. 1. Glied ca. 4 mal so lang wie breit; 2. doppelt so lang wie das 1.; 3. etwas länger als das 1. Endgriffel fehlt. Rüssel schwarz, $1\frac{1}{2}$ mal kopflang. Hinterkopf schwarz, am Augenrand fein weiss gesäumt. Thorax ganz schwarz, vor dem Schildchen ein bräunlichroter Strich. Schulterbeulen goldgelb tomentiert. Hinterrücken oben und Seitenplatten fein bräunlich tomentiert. Pleuren schwarz, ohne Schillerstrieme. *p* dunkelgelbbraun; *f* zu etwa $\frac{2}{3}$ schwarzbraun. Hüften schwarzbraun, weiss schillernd. Schwinger, Schüppchen gelblich. Flügel hyalin. Flügelbinden vom Vorderrand bis r_4 braun, auch der Raum unterhalb der *vena spuria*. 1. Hinterandzelle unten mit hyalinem Spitzenfleck. 2. Basalzelle und Basis und Unterrand der Discalzelle braun. Abdomen sammetschwarz, 2. Ring mit breit rotgelber Hinterandbinde, die $\frac{2}{3}$ der Ringbreite einnimmt und sich seitlich verjüngt. 6. mit grossem, goldgelbem Fleck, der fast den ganzen Ring ausfüllt. Analsegment und Theka tiefschwarz. Theka verhältnismässig klein, dornförmig. Haftläppchen gelbbraun, Klauen dunkelrotbraun mit schwarzer Spitze.

PHYSOCEPHALA Schin.

Die von mir beschriebene *P. pallipes* ist syn. zu *P. nigrotestacea* Macq. Hinzukommt *P. macer* Big. und *P. sphegiformis* Walk.

Zu *nigrotestacea* Macq. gehört nach des Autors eignen Worten *P. emarginata* Macq. wohl als Varietät.

P. macer Big. von Australien, ohne Abdomen. Type: London.

Spitze des 2. und 3. Fühlergliedes rotgelb. Backen braunrot. Gruben durch eine feine braune Linie eingefasst. Schulterbeulen und Pleuren rotbraun. Untergesicht gelb, Gruben weisslich. Ueber der Fühlerbasis ein braunes, senkrechtcs Strichelchen, das sich vor der Scheitelblase stark verbreitert. 1. Fühlerglied ca. doppelt so lang wie breit, 2. ca. $2\frac{1}{2}$ mal so lang wie das 1.; 3. = dem 1. Endgriffel kurz, 2 gliedrig. Rüssel schwarz, ca. $1\frac{1}{2}$ mal kopflang. Kopf ohne Silberglanz, Hinterkopf oben schwarz, unten gelb, am Augenrand silberglänzend. Thorax, Schildchen, Hinterrücken schwarz. Hüften schwärzlich. *p* hellgelbbraun. *f*₃ oben etwas bräunlich verdunkelt. Haftläppchen bräunlich, Klauen rotbraun. Flügelvorderrand braun, einschliesslich beider Basalzellen. 1. Hinterrandzelle bis zur *vena spuria* braun; Unterrandzelle bis zur Spitze.

STENOCONOPS, gen. nov.

Eine sehr schlank gebaute Gattung. 2., 3. und 4. Tergit fast gleich lang, jedes ca. $\frac{1}{2}$ mal länger als breit. Hinterleib bis zum 4. Ring einschliesslich fast parallelrandig, dann kaum etwas erweitert. Fühlerglieder scharf abgesetzt. 3. Glied etwa doppelt so lang wie das 2. Griffel 3 gliedrig. Stirn flach gefurcht, mit etwas vertieft liegendem Fühlerhöcker, auf dem die Fühler unmittelbar nebeneinander an der Vorderseite sitzen (also nicht, wie bei der mir unbekannt gebliebenen *Pleurocera* Macq., an den Seiten!). Untergesicht zurückweichend. Rüssel ca. doppelt kopflang, dünn. Vertexkissen dreieckig vorspringend, mit 3 deutlichen Ozellen. Flügel wie bei *Conops*, hyalin, ohne Binde. Theka klein, dornförmig, etwas weiter vorspringend als die Hinterleibspitze.

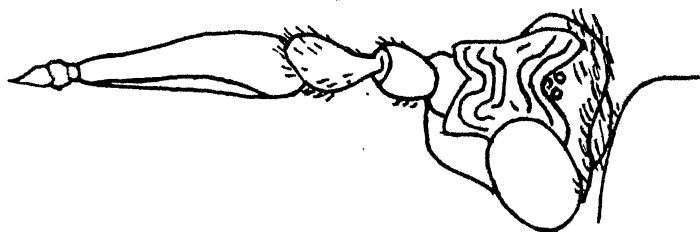
S. niger, n. sp., ♀, von W. Australien. Type: London.

Länge 9 mm. Fühler 1·2 mm.; Flügellänge 5 mm., -breite 1·5 mm.

Schwarz, glanzlos. Kopf wie oben beschrieben, schwarz. Untergesicht gelb, Gruben weissgelb, Kiel gelb. Am Augenrand bis zum Scheitel hinauf silberglänzend. Fühler tiefschwarz. Rüssel schwarz, an der Basis bräunlich. Augen fast kreisrund. Backen sehr schmal. Hinterkopf oben schwarz, unten gelb, zart schwarz

Beulen intensiver. Pleuren grau, ohne Schillerstrieme. Hüften etwas bräunlich. *p* braun, *f*₁ und *f*₂ unten in der Spitzenhälfte gelbrot. *t* gelblich, vor der Spitze mit dunklem Ring. *t* ganz braun. Tarsen dunkelbraun, Haftläppchen gelbbraun. Schüppchen, Schwinger weisslich, Stiel braun. Flügel glashell, ohne Binde, stark

Fig. 12.

*Stenoconops niger*, n. sp., ♀. Kopf von oben.

irisierend. Seitenplatten des Hinterrückens weiss-schimmernd. Hinterleib schlank, schwarz, glanzlos, 5 mm. lang! Hinterränder und Seiten ganz zart weiss-schimmernd. Analsegment etwas glänzend. Behaarung sehr zart, schwarz, am Thorax etwas länger und dichter. Theka klein, dornförmig, gelbbraun, unten an der Spitze schwärzlich. Bauch schmal, gelblich der Länge nach.

(To be continued.)

LIII.—*The Affinities of the Pycnodont Ganoid Fishes.*

By Sir ARTHUR SMITH WOODWARD, F.R.S.

MANY years ago Traquair (6) clearly distinguished the Mesozoic Pycnodont fishes from the Palæozoic Platysomids, which were similar in shape and had several characters in common. He showed that the Pycnodonts belonged to the typically Mesozoic Holostean ganoids, while the Platysomids were characteristic Chondrosteans or Acipenseroids such as flourished everywhere in the later Palæozoic. He therefore anticipated that links would be found between the highly specialised Pycnodonts and the more normal *Lepidotus*-like ganoids, just as there were links between the Platysomids and the less specialised Carboniferous Palæoniscids.

although the Pycnodonts and Platysomids belong to two distinct successive grades, the one group has been directly derived from the other. Partial links between the two groups are now known from the Lower Trias of Madagascar (7) and East Greenland (5). A highly specialised type of Chondrosteian has thus evidently passed into a still more specialised type of Holosteian. The rest of the Holosteians must have arisen independently from other Chondrosteian ancestors.

As Traquair originally pointed out, the preoperculum in the Palæozoic Chondrosteians is a cheek plate extending forwards above the maxilla, whereas that of the typical Holosteians forms merely a narrow anterior rim to the opercular apparatus. Among Triassic ganoid fishes almost all gradations between the Chondrosteian and the Holosteian development of this bone have now been found (2). Most of the Triassic Chondrosteians with the variable preopercular cheek plate are beginning to approach the Holosteians in the reduction of the upper caudal lobe, the near correlation of the median fin supports with their dermal rays, and the extreme reduction of the clavicles (formerly described as infraclavicles). Many Triassic Holosteians are in all ways typical of their grade except in the primitive character of the preoperculum. The known links between the two grades are now, indeed, so numerous, that it has been proposed to group them as Sub-Holostei (2).

The Sub-Holostei hitherto recognised are nearly all of Triassic age, only rare survivors occurring in the Lias, but it must now be added that they also include the Pycnodonts, which have the preoperculum much extended as a cheek plate and retain it in this form until their end in the Eocene period. The preoperculum is usually widest below, tapering gradually upwards until it ends in a short upper edge, where a relatively small quadrangular plate separates it from the cranial roof. Sometimes it is more irregular in shape, with a production of the antero-inferior angle, and its wavy upper edge firmly united with a rather large upper plate. Essentially the same arrangement has been observed in the Lower Triassic *Bobasatrania* (5, 7), which is a Chondrosteian Platysomid; and the large lower preopercular plate of nearly the usual Pycnodont shape is known in the Sub-Holosteian *Atheodontus* from the Middle Triassic of Perledo,

Italy, which exhibits rounded crushing teeth on the palatopterygoid and on the lower jaw (2).

The Sub-Holostei, like the Palæozoic Chondrostean Palæoniscids, are also characterised by a comparatively short parasphenoid bone, which is expanded behind and tapers into a small cultriform process in front. It must therefore be noted that the parasphenoid in the only Pycnodont in which it has been observed, *Mesturus* (8), is especially short and broad with an attenuated cultriform process. The bone is very different from that of any typical Holostean ganoid which has been examined.

Finally, it is worthy of note that at least as early as the Middle and Upper Jurassic the cheek plates and most of the branchiostegals in the Pycnodonts (e. g., *Mesturus* and *Gyrodus*) are already subdivided into a mosaic of polygonal tesserae, while some of the bones of the cranial roof are irregularly subdivided. Such breaking up of superficial plates is usually a mark of senility, and if the Pycnodont lineage dates back to the end of the Palæozoic, as now seems clear, it is more readily explained than it would be if the earliest known Pycnodont, *Eomesodon hoeferi* from the Rhætic (4), had just been derived from a Holostean.

It is therefore interesting to note that the only Sub-Holostei which have a long range in geological time belong to the most highly specialised lineage of the group. The less specialised forms ranged from the Upper Carboniferous of Europe (*Phanerorhynchus*) (3) and North America (*Teleopterina*) (1) to the European Lias (*Ptycholepis*), but were especially abundant and varied in the Trias when the Chondrosteans were being rapidly replaced by the Holosteans.

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LIV.—*Elphidium icenorum*: a new Species of Foraminifera from the sub-Recent Deposits of the Cambridge-shire Fenland. By W. A. MACFADYEN, M.C., M.A., Ph.D., F.G.S.

[Plate XV.]

SOME seventy samples of silts and clays from the post-glacial and often brackish water deposits of the English Fenlands have been examined in connection with the work of the Fenland Research Committee. The Foraminifera were recorded, and in several cases these records have been published*, a summary of the results being given in the last-mentioned paper in the footnote. Some one hundred and forty indigenous species in all have been recognized. These are well-known forms living to-day in British seas, with a single exception which appears to be undescribed.

Elphidium icenorum, sp. n. (Pl. XV. figs. a, b.)

1933. *Elphidium* cf. *poeyanum* (d'Orbigny) Macfadyen, in Clark, Antiq. Journ. xiii. p. 290.

1938. *Elphidium icenorum* Macfadyen MS., nom. nud., Geol. Mag. lxxv. pp. 415, 416.

Diagnosis.—An *Elphidium* of small size; periphery

* 1933. Macfadyen, W. A., Geol. Mag. lxx. pp. 182-191; in Grahame Clark, Antiquaries Journ. xiii. pp. 289-292; in Gordon Fowler, Cambridge Antiq. Soc. Commns. xxxiii. pp. 125-127; in T. Neville George, Proc. Swansea Sci. Field Nat. Soc. i. pp. 190-191.

1934. Macfadyen, W. A., in S. Hazzledine Warren et al., J. Roy. Anthropol. Inst. lxiv. p. 128.

1938. Macfadyen, W. A., in Godwin, H., Geogr. Journ. xci. p. 247; in Godwin, H., and Clifford, M. H., Phil. Trans. Roy. Soc. ser. B, cccxix. no. 562, pp. 360-362; Geol. Mag. lxxv. pp. 409-417.

broadly rounded, margin generally entire, but sometimes slightly lobulate, particularly as regards the last one or two chambers, which are often inflated more than the others; umbilical region flush with the surface, covered with fine granulations; six to eight chambers in the last whorl, commonly seven; sutures very slightly depressed, marked by characteristic retral processes up to about fourteen in number (as seen from one side), difficult to count, long and fine, not continuous across the septa but interrupted by a slight septal ridge, and often alternating; aperture, a line of pores at the base of the apertural face; in some specimens lines similar in size to the retral processes run upwards from these pores to about halfway across the apertural face; shell-wall markedly punctate, rather coarsely for so small a shell.

Dimensions.—Thirty-two measured specimens varied from 0.17–0.33 mm. in greatest diameter, with a mean of 0.22 mm.; thickness up to 0.13 mm. in the final chamber.

Material and Locality.—In all thirty-seven specimens have been found, distributed as follows:—

1. Littleport–Mildenhall Drain, $1\frac{3}{4}$ miles S.E. of Shippea Hill Level Crossing; Buttery Clay; 1 specimen (125.2) *.
2. Three Holes Farm, Upwell (Cock Fen), Romano-British site; clay at 0.4–0.5 m. depth, Bore no. 2; 1 specimen (159.1).
3. Plantation Farm, Shippea, 7 miles E.N.E. of Ely; Early Bronze age site (see Grahame Clark, 1933, p. 291):—

Sample J. Blue silty Buttery Clay, 2' 9" below its surface, in Bore no. 3; 8 specimens (153.16).

Sample K. Blue silty Buttery Clay, 6' 6"–6' 10" below its surface, *i. e.*, the basal

* These numbers in brackets refer to the slide and compartment numbers of the specimens, which, except the holotype, are in the author's collection, and will eventually be deposited in the Sedgwick Museum, Cambridge.

four inches, in Bore no. 3 ; 24 specimens (154.18).

Sample N. Grey clayey silt, below the peat-band, at 10' 6" depth, in Bore no. 13 ; 1 specimen (165.9).

4. Poplar Farm, March ; Romano-British site in the Roddon :—

Sample A. Brown clayey silt below the channel peat ; " 330' E. Bank " ; 1 specimen (171.15).

Sample E. Brown clayey silt ; " 300' E. Bank " ; 1 specimen (177.7).

Holotype : Sedgwick Museum, Cambridge, Slide Regd. no. 668, from sample K, Plantation Farm, Shippea.

Remarks.—The curious and entirely characteristic septal areas give a herring-bone ornamentation-effect, particularly of the last one or two septa, and when the latest chambers are conspicuously inflated.

Superficially *E. icenorum* * may be compared in its markedly punctate appearance with *E. poeyanum* (d'Orbigny) †, but here the similarity ends, *E. poeyanum* having the normal type of septal bridge and up to about fifteen chambers in the last whorl.

E. millettii (Heron-Allen & Earland) ‡, described from Recent material from the Kerimba Archipelago, off Portuguese East Africa, has a herring-bone pattern of raised lines and beads, partially over the test, but this is a surface ornamentation and has no special connection with the septal region ; the test itself is also quite distinct, with ten to twelve visible chambers, while retral processes are not apparent.

E. icenorum, named after the Icenii, a British tribe who lived in the neighbourhood in Roman times, is thus a characteristic form that, I think, is not likely to be confused with any species hitherto described.

* For specimens of *E. poeyanum* from the West Indies, and of *E. millettii*, I am indebted to Dr. Maurice Black and Mr. Arthur Earland respectively.

† In De la Sagra, Hist. Phisiq. etc. Cuba, 1839, "Foraminifères," p. 55, pl. vi. figs. 25, 26.

‡ Trans. Zool. Soc. London, xx. 1915, p. 735, pl. liii. figs. 38–42.

It is of interest to be able to date archæologically the deposits in which this species was found. The Buttery Clay at Plantation Farm is, according to Grahame Clark (1933, p. 295), of late Mesolithic age. The Roddon silt of the same locality and of Poplar Farm, near March, was being deposited at a later date, in Romano-British times, and the deposition probably did not cease until the Middle Ages. *E. icenorum* is thus known to have lived between, let us say, 2500 B.C. and 1000 A.D. Whether it is still living is unknown. Since its habitat appears to have been one of estuarine or brackish water, it may possibly still be found in such situations to-day, but not living in the open sea.

EXPLANATION OF PLATE XV.

Elphidium icenorum, *sp. n.* Holotype, $\times 220$.

Fig. a. Side view.

Fig. b. Front view, showing apertural pores.

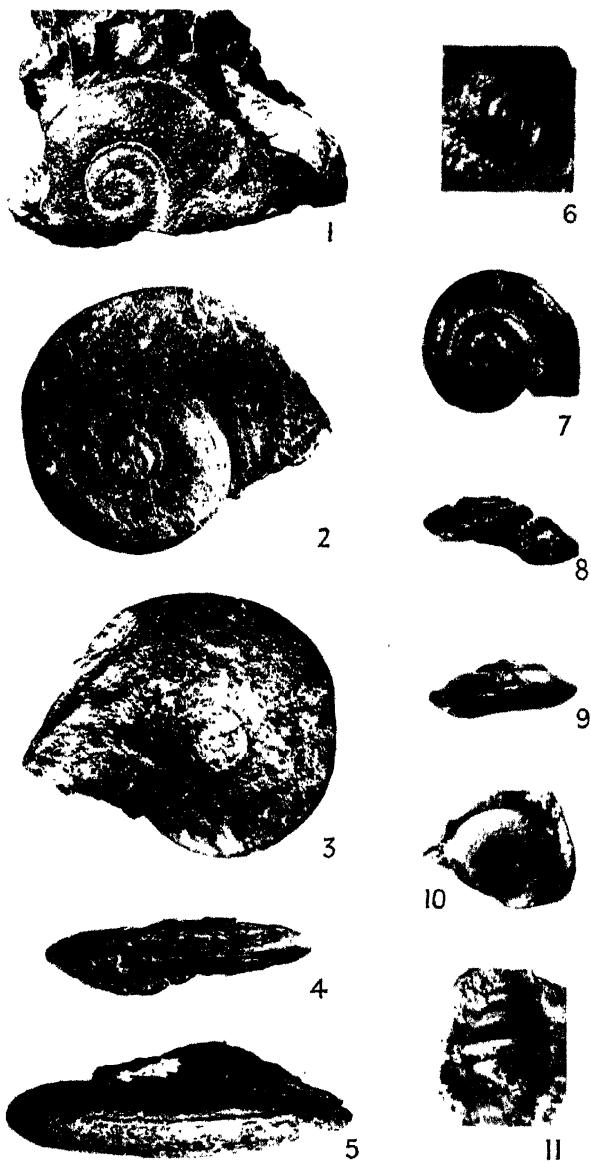
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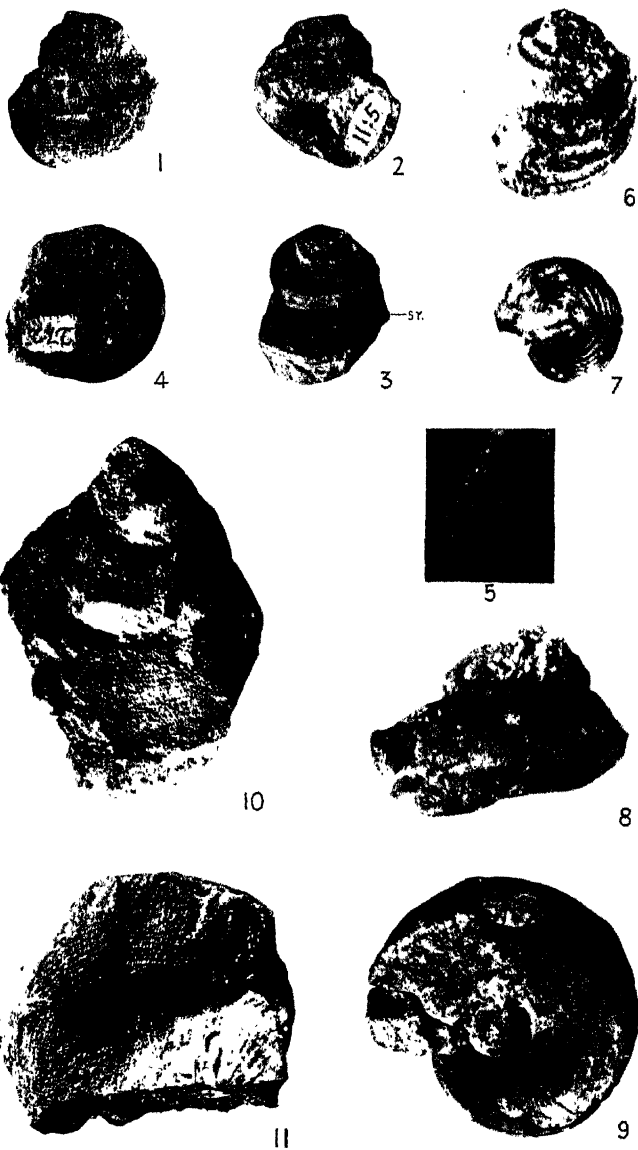
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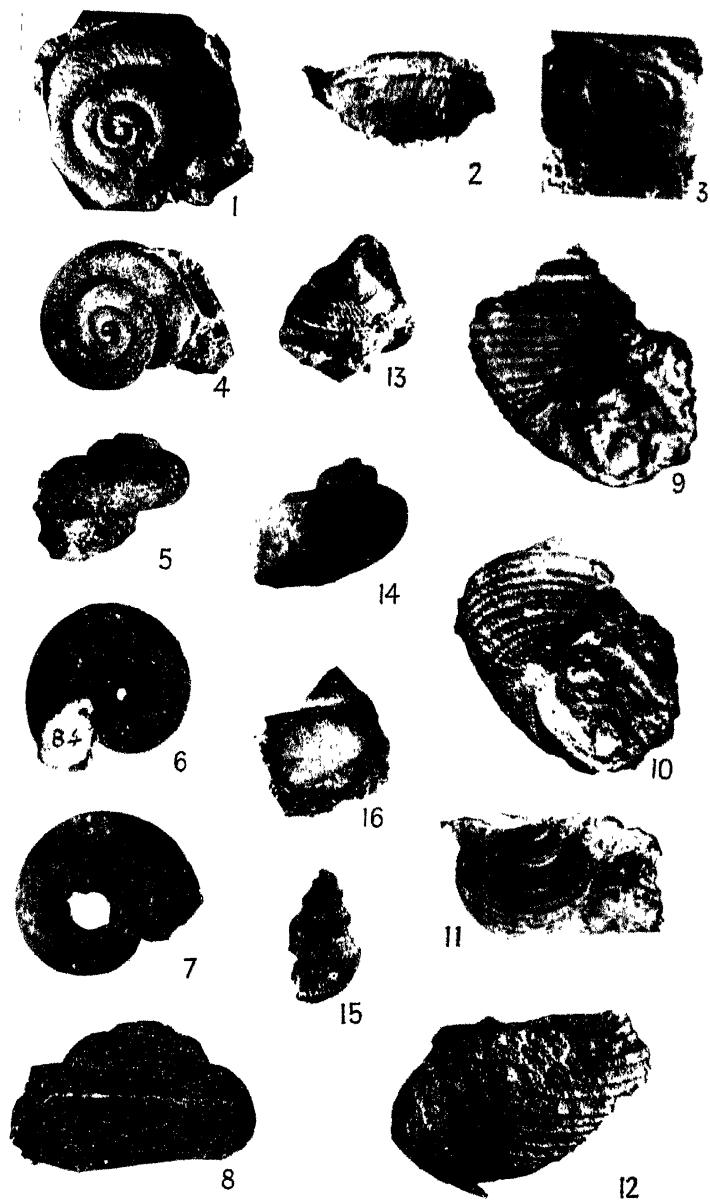
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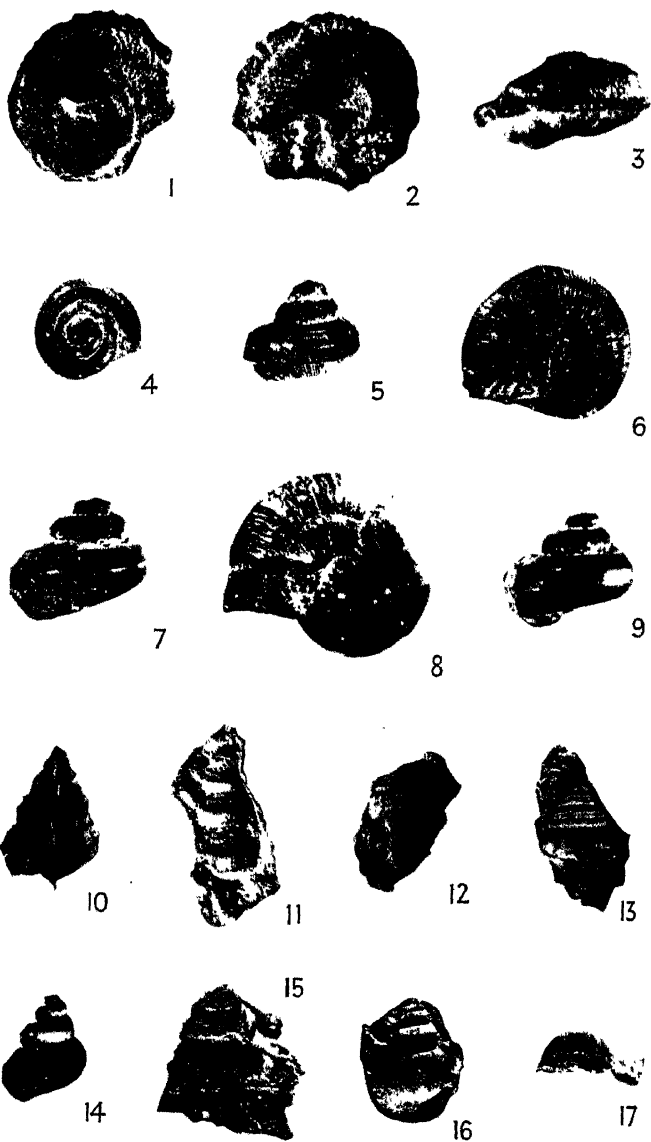
Liospira and Lophospira.



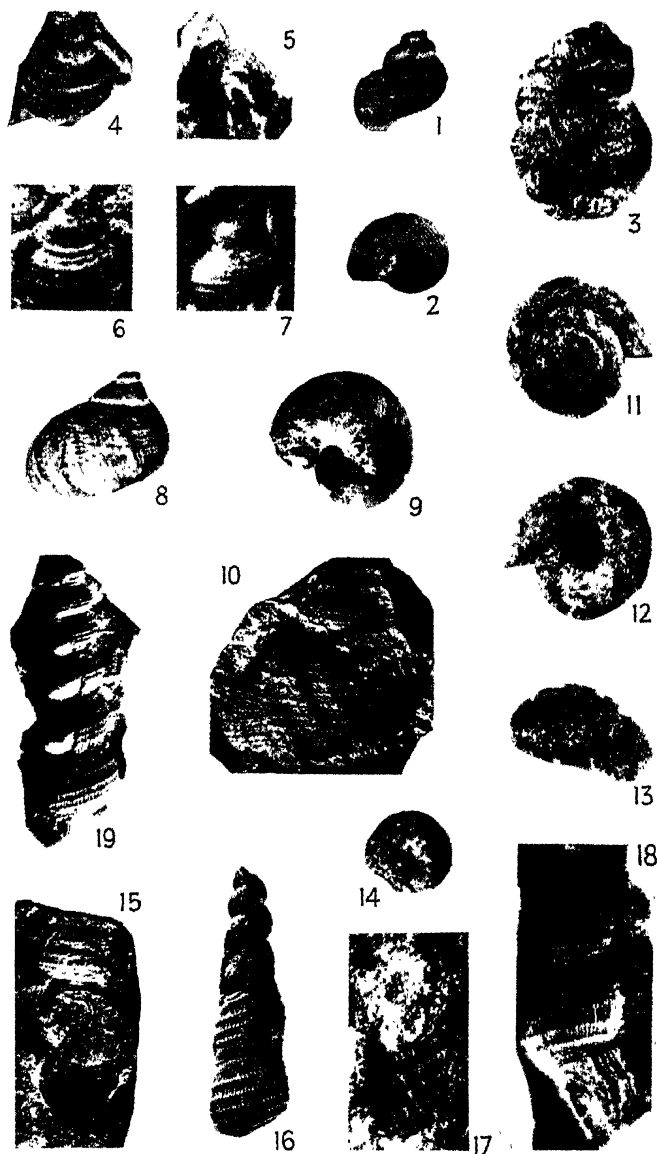
Lophospira.



Stenoloron, Phanerotrema, Ulrichospira, and Globispira.



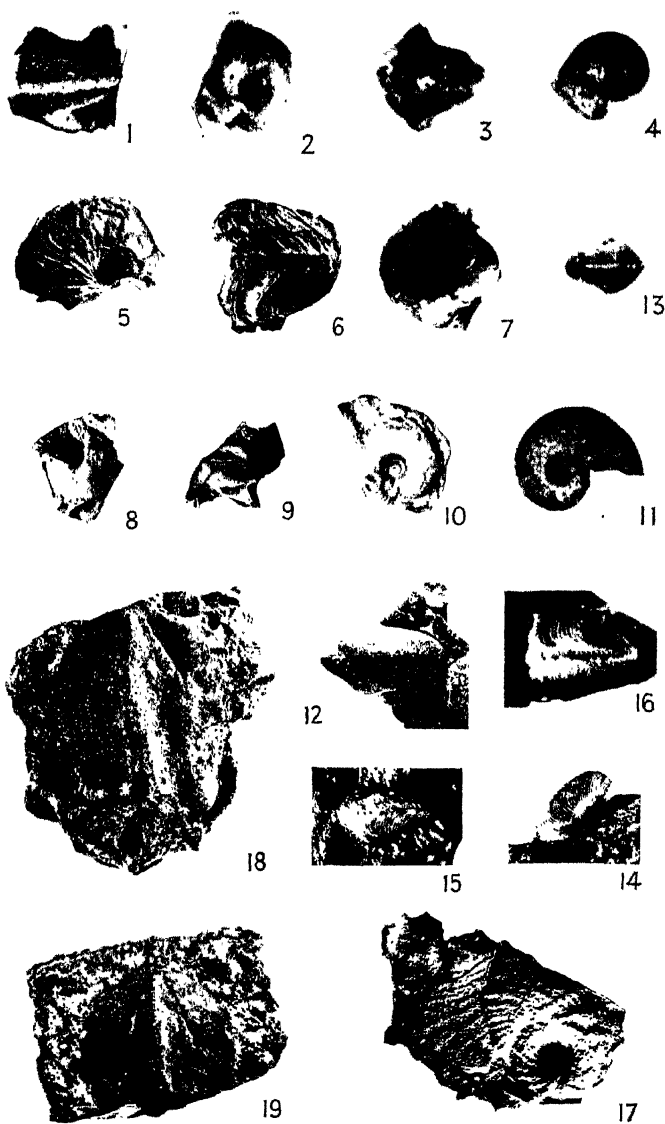
Euomphalopterus, Trochonema, and Eunema.



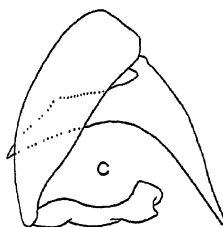
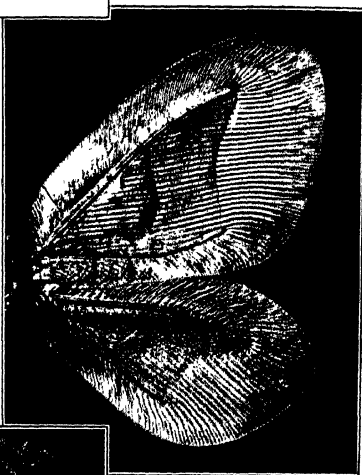
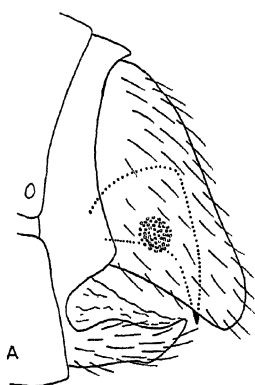
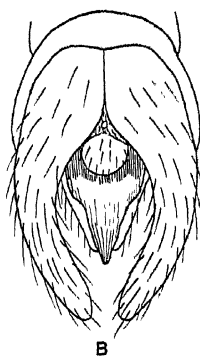
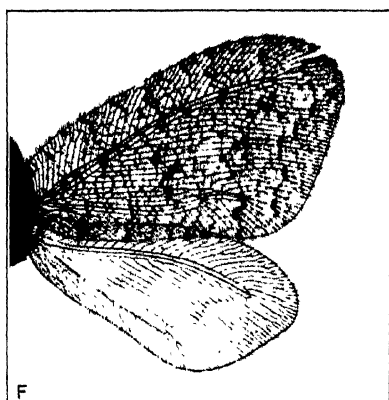
Gyronema, Cyclonema, Anomphalus, and Holopella (?)



Holopella (?), *Fusispira*, *Pagodea*, *Platyceras*, and *Sinuitopsis*



Bucaniella, Bellerophon, Bucaniopsis, Temnodiscus,
Trematonotus, and Pterotheca.



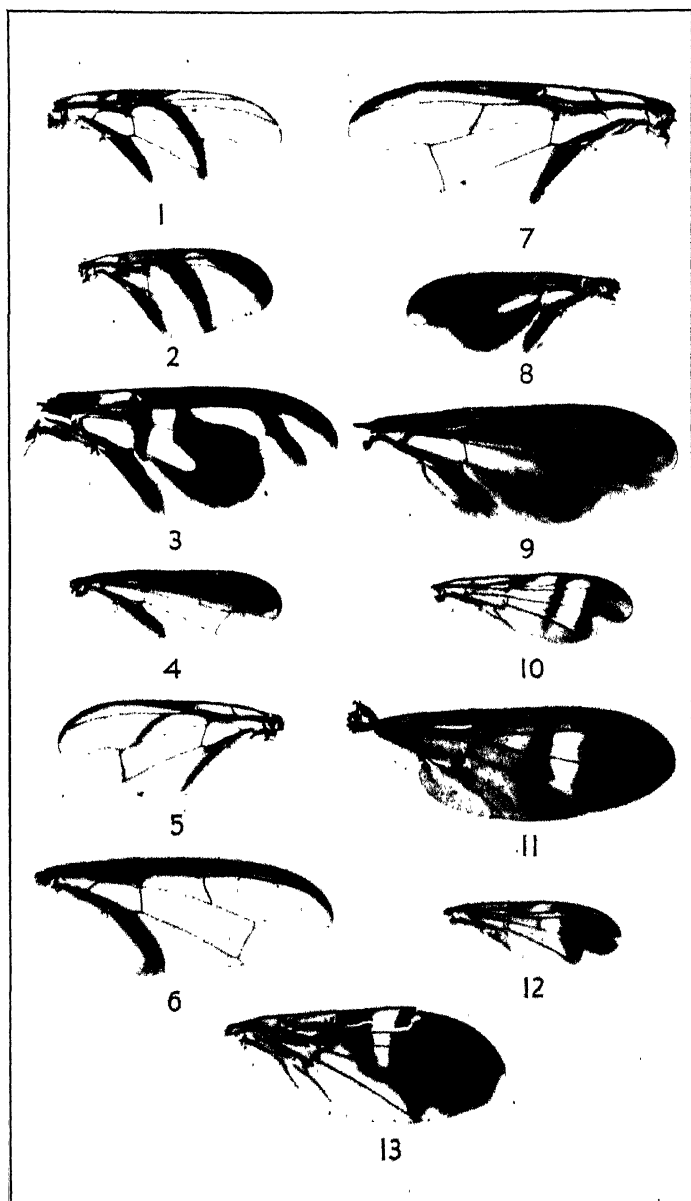
Phot. D. E. K.

Psychopsidæ.

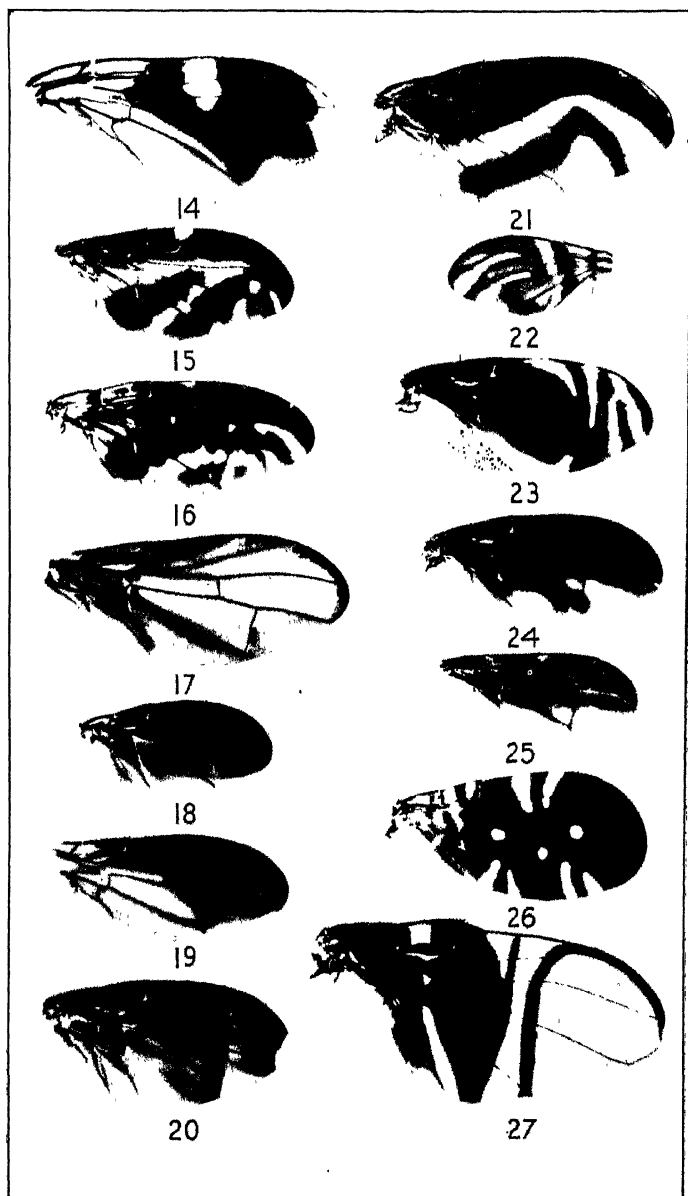


Fig. 1.—*Xenomantis somalica* (Beier), ♂, type.

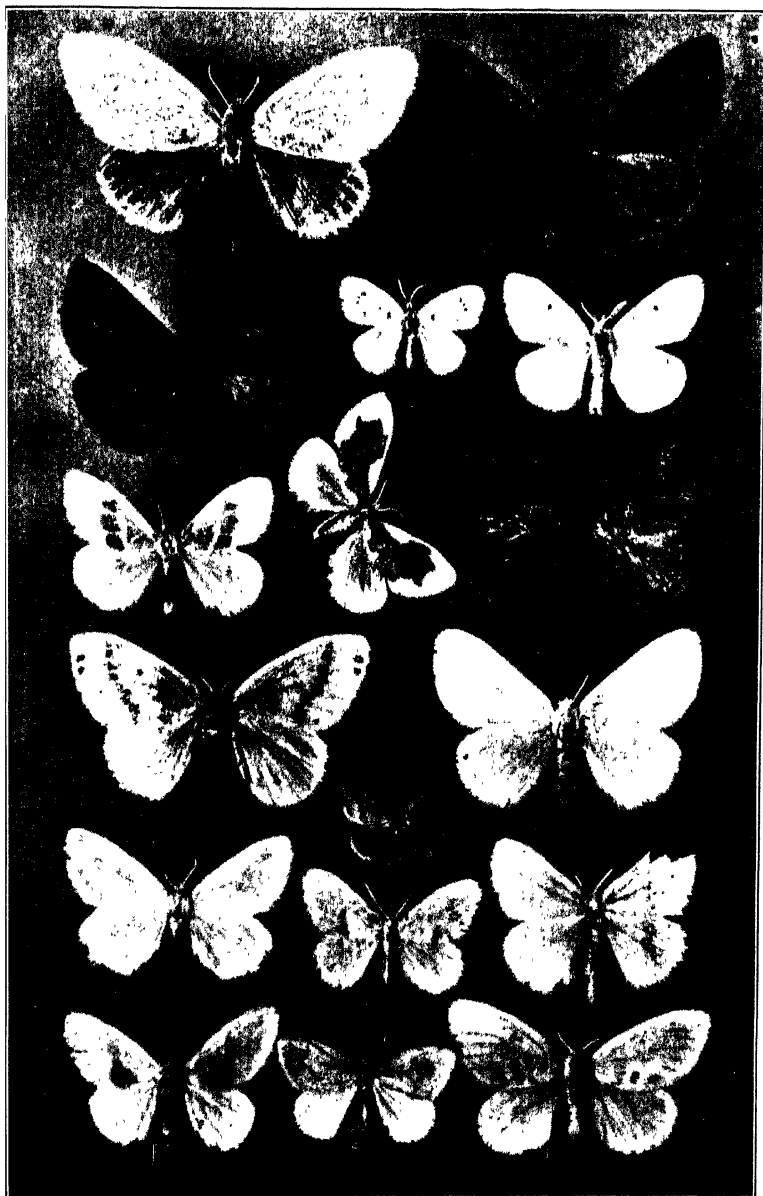
Fig. 2.—*Xenomantis palmorum*, sp. n., ♀, type



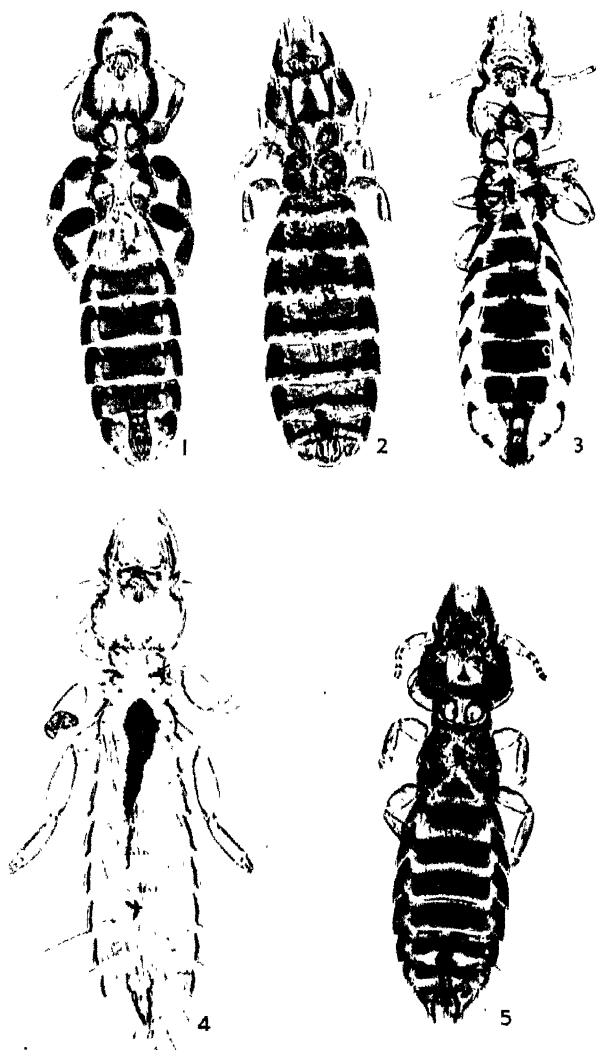
Solomon Islands Trypetidæ.



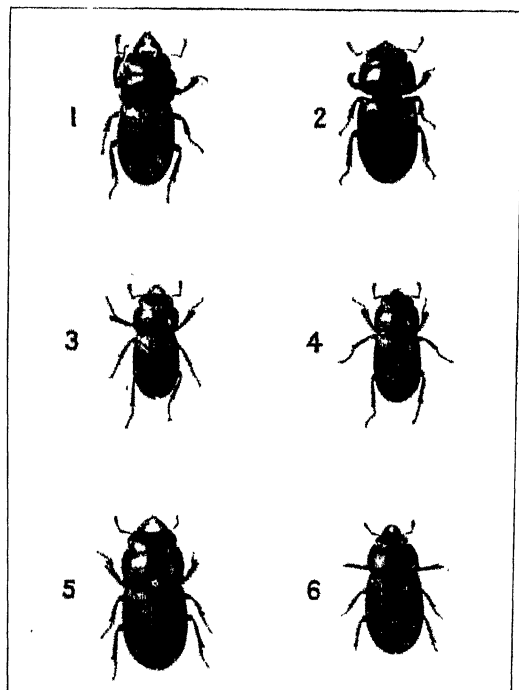
Solomon Islands Trypetidæ.



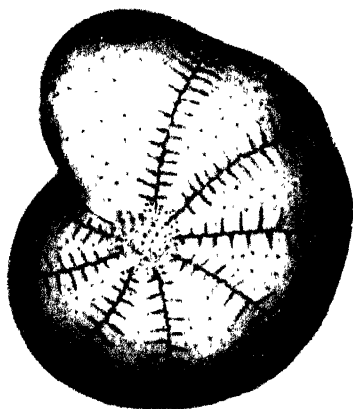
New Lymantriidæ from Asia and the East Indies.



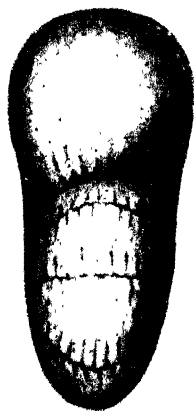
Mallophaga from Charadriiformes.



Lucanidæ of the Caroline Islands.
(Slightly enlarged.)



a.



b.

E. T. TALBOT del.

ELPHIDIUM ICENORUM, sp. n. x220.

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